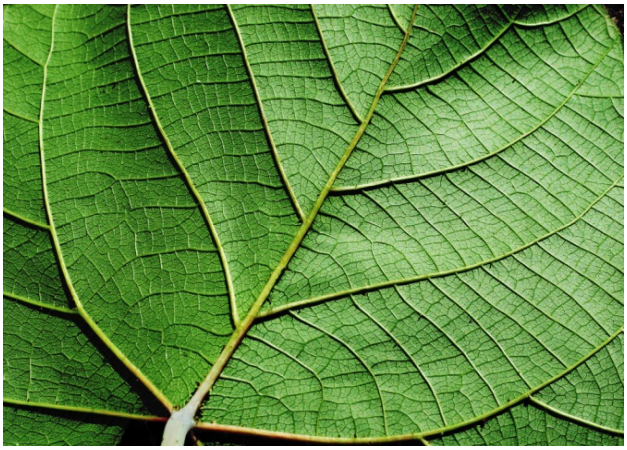
City of Vista
Climate Action Plan

2012 - 2013 Edition



rincon

CITY OF VISTA
CALIFORNIA

City of Vista
Climate Action Plan

November 2012

Prepared for:

CITY OF VISTA
CALIFORNIA

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GLOSSARY OF TERMS

Acronyms

AB	Assembly Bill
CAL FIRE	California Department of Forestry and Fire Protection
CALGreen	California Green Building Standards Code
Caltrans	California Department of Transportation
CAFE	Corporate Average Fuel Economy
CAP	Climate Action Plan
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
CH_4	Methane
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
EDCO	Escondido Disposal Corporation
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
GHG	Greenhouse gas
HFC	Hydrofluorocarbons
HVAC	Heating, ventilating, and air conditioning
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
kWh	Kilowatt hours
LCFS	Low Carbon Fuel Standard
LED	Light-Emitting Diode
MHCP	Multiple Habitat Conservation Program
MPO	Metropolitan Planning Organization
MT	Metric tons
NCTD	North County Transit District
N_2O	Nitrous oxide
O_3	Ozone
PFCs	Perfluorocarbons
PPM	Parts per million
RCS	Resource Conservation and Sustainability Element
SANDAG	San Diego Association of Governments
SDAPCD	San Diego Air Pollution Control District
SDG&E	San Diego Gas and Electric
SB	Senate Bill
VMT	Vehicle miles traveled

EXECUTIVE SUMMARY

Executive Summary

Although climate change is a global issue, the State of California (State) has taken an active approach to address climate change and reduce statewide greenhouse gas (GHG) emissions through the adoption of legislation, such as Assembly Bill (AB) 32 (the Global Warming Solutions Act of 2006) and Senate Bill (SB) 97 (the California Environmental Quality Act [CEQA] and GHG Emissions bill of 2007). AB 32 establishes a target to reduce statewide GHG emissions to 1990 levels by 2020. In order to achieve this target, the California Air Resources Board (CARB) calls on local governments to reduce GHG emissions by 15 percent from 2005 levels by 2020, consistent with the statewide commitment.[1] SB 97 requires lead agencies to analyze GHG emissions and mitigate climate change impacts under CEQA. These laws together create a framework for GHG emissions reductions and identify local governments as having a vital role to play in assisting the State in meeting California's reduction target.

Recognizing the important role and responsibility that local governments have in reducing GHG emissions and mitigating their potential climate change impacts, the *City of Vista General Plan 2030 Update* (General Plan 2030) and associated *Program Environmental Impact Report* (PEIR) direct the City of Vista (City) to prepare and implement this Climate Action Plan (CAP).

What is a CAP?

The City's CAP is a long-range plan to reduce GHG emissions from municipal operations and community activities within Vista and prepare for the anticipated effects of climate change. The CAP will also help achieve multiple community goals such as lowering energy costs, reducing air pollution, supporting local economic development, and improving public health and quality of life. Specifically this CAP is designed to:

- Benchmark Vista's 2005 GHG emissions and 2020 projected emissions relative to the statewide emissions target, established under AB 32.
- Provide a roadmap for achieving the State-recommended target of 15 percent below 2005 levels by the year 2020 and help Vista prepare for anticipated climate change impacts.
- Implement General Plan 2030 Resource Conservation and Sustainability Element (RCS) Policy 2.1, which directs the City to prepare and implement this CAP.
- Comply with General Plan 2030 PEIR Mitigation Measure M-CC-1: CAP Implementation, which calls for the development and implementation of this CAP to mitigate potential GHG emissions and climate change impacts associated with buildout of General Plan 2030. The State CEQA Guidelines encourage the adoption of plans or mitigation programs as a means of comprehensively addressing the cumulative impacts of projects (see State CEQA Guidelines, Sections 15064(h)(3), 15130(c)).
- Support tiering and streamlining of future projects within Vista pursuant to State CEQA Guidelines Sections 15152 and 15183.5.

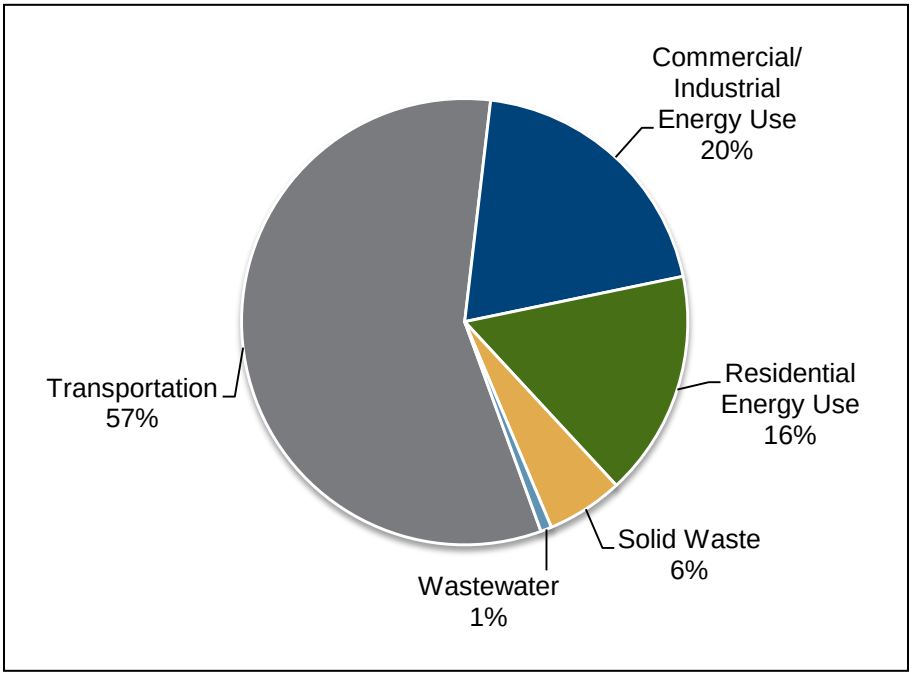
Vista's GHG Emissions

The *City of Vista Greenhouse Gas Emissions Inventory* (2009)[2] (GHG Emissions Inventory) was prepared to identify the major sources and quantities of GHG emissions produced in Vista in 2005 and forecast how

these emissions may change over time. The GHG Emissions Inventory provides information on the scale of emissions from various sources and where the opportunities to reduce emissions lie. It also provides a baseline against which the City can measure its progress in reducing GHG emissions.

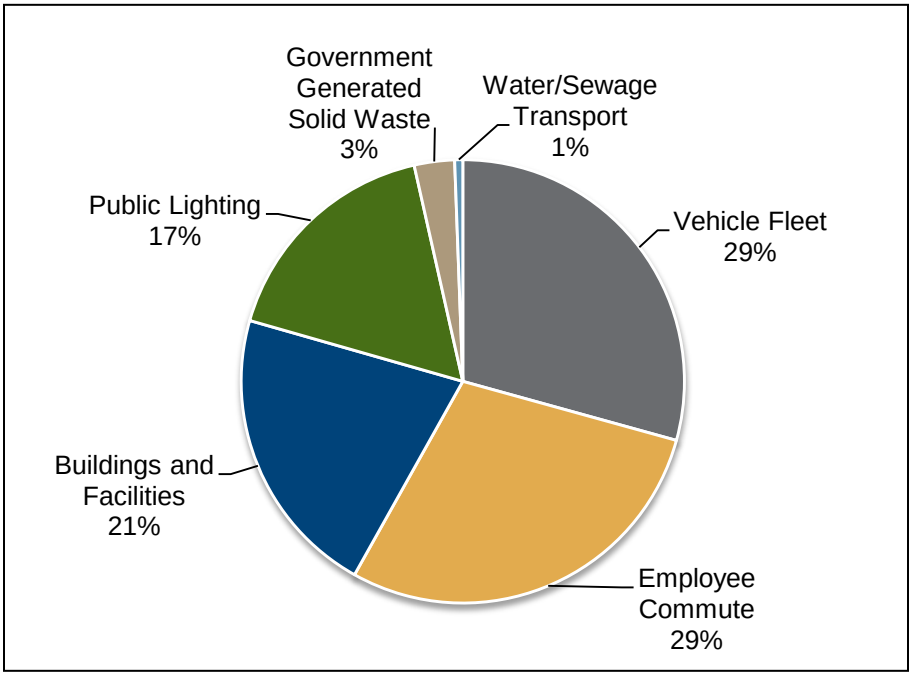
According to the GHG Emissions Inventory, in 2005, the Vista community emitted approximately 547,039 metric tons of carbon dioxide equivalent GHG emissions (MT CO_2e), as a result of activities that took place within the transportation, residential energy use, commercial and industrial energy use, solid waste, and wastewater sectors. As shown in **Figure ES-1**, the largest contributors of GHG emissions were the transportation (57 percent), commercial/industrial energy use (20 percent), and residential energy use (16 percent) sectors. The remainder of emissions resulted from the solid waste (six percent) and wastewater (one percent) sectors.

Figure ES-1: Community GHG Emissions by Sector (2005)



The GHG Emissions Inventory also analyzed emissions from municipal operations and facilities. The municipal inventory is a subset of the community inventory, meaning that the local government's GHG emissions are included within the community inventory. In 2005, municipal operations generated approximately 3,865 MT CO_2e. This quantity represents approximately seven percent of Vista's total community GHG emissions. As shown in **Figure ES-2**, the majority of these GHG emissions resulted from the City's vehicle fleet (29 percent), employee commutes (29 percent), building and facility energy use (21 percent), and public lighting (street lights, traffic signal lights, and other outdoor public lighting) (17 percent).

Figure ES-2: Municipal GHG Emissions by Sector (2005)



The GHG emissions forecast is a projection of how GHG emissions will change in the future with anticipated changes in population, households, and employment. The "business-as-usual scenario" provides a forecast of how GHG emissions will change in the year 2020 if consumption trends and behavior continue as they did in 2005, absent any new federal, state, regional, or local policies or actions that would reduce emissions. The year 2020 was selected for the forecast in order to maintain consistency with AB 32.

Under the business-as-usual scenario, Vista's GHG emissions are projected to grow approximately 14 percent above 2005 GHG emissions levels by the year 2020, from 547,039 MT CO_2e to 625,957 MT CO_2e. Emissions associated with the transportation sector will experience the highest level of growth (22 percent). Emission increases for the other sectors will range from two to six percent. **Table ES-1** shows the forecast results of the business-as-usual scenario.

Table ES-1: 2020 Business-As-Usual GHG Emissions Forecast

Sector	2005 (MT CO_2e)	2020 (MT CO_2e)	Percent Change from 2005 to 2020
Transportation	314,097	383,654	22%
Commercial / Industrial	108,749	113,660	5%
Residential	89,534	91,737	2%
Solid Waste	30,310	32,275	6%
Wastewater	4,349	4,631	6%
TOTAL	**547,039**	**625,957**	**14%**

The *AB 32 Climate Change Scoping Plan* (2008) (AB 32 Scoping Plan), prepared by CARB pursuant to AB 32, identifies several State measures that are approved, programmed, and/or adopted and would reduce GHG emissions within Vista. These State measures require no additional local action. Therefore, these measures were incorporated into the forecast and reduction assessment to create an "adjusted business-as-usual scenario," which provides a more accurate picture of future emissions growth and the responsibility of the City once State measures to reduce GHG emissions have been implemented.

Under the adjusted business-as-usual scenario, GHG emissions are projected to decrease approximately 10 percent below 2005 GHG emissions levels by the year 2020, from 547,039 MT CO_2e to 492,170 MT CO_2e. This is 21 percent lower than the business-as-usual scenario. **Table ES-2** summarizes the reduction in local GHG emissions that would result from State measures.

Table ES-2: Summary of State Reductions and 2020 Adjusted Business-As-Usual GHG Emissions Forecast

State Measure	2020 Reduction (MT CO_2e)
Clean Car Standards, AB 1493 (Pavley)	52,328
Low-Carbon Fuel Standard	25,262
Passenger Vehicle Efficiency	10,078
Heavy-Duty Vehicle Efficiency	8,421
Renewable Portfolio Standard	37,698
Total State Reduction	**133,787**
2020 Adjusted Business-as-Usual Forecast	**492,170**

GHG Emissions Reduction Target

The City is committed to reducing its GHG emissions by 15 percent below 2005 levels by 2020, consistent with AB 32. As shown in **Table ES-3,** based on the 15 percent reduction target Vista would need to reduce its community GHG emissions to 464,983 MT CO_2e by 2020. To meet this target, Vista will need to reduce its GHG emissions 5.5 percent below the adjusted business-as-usual forecast level (equivalent to 27,187 MT CO_2e) by 2020 through implementation of local measures and actions.

Table ES-3: Vista's GHG Emissions, Target, and Reduction Necessary to Meet Target

	GHG Emissions (MT CO_2e)
2005 Baseline Emissions	547,039
2020 Adjusted Business-as-Usual Forecast	492,170
Target (15% below 2005 levels by 2020)	464,983
Total Reduction from 2020 Adjusted Business-as-Usual Forecast Necessary to Meet Target	**27,187**

Climate Action Measures

To achieve the State-recommended target of 15 percent below 2005 levels (464,983 MT CO_2e) by 2020 and prepare for the anticipated effects of climate change, the CAP identifies climate action measures. These measures are organized into the following six focus areas: Municipal Operations, Energy, Transportation and Land Use, Solid Waste, Public Education and Outreach, and Adaptation. The measures were selected based on careful consideration of the emission reductions needed to achieve the target, the distribution of emissions revealed in the GHG Emissions Inventory, goals and policies identified in General Plan 2030, existing priorities and resources, policies and strategies of neighboring jurisdictions and regional agencies, and the potential costs and benefits of each measure. Collectively, the measures identified in the CAP have the potential to reduce GHG emissions within Vista by 32,033 MT CO_2e (6.5 percent below the year 2020 adjusted business-as-usual forecast) by 2020 and meet the reduction target.

Implementation and Monitoring

Implementation and monitoring are essential processes to ensure that Vista reduces its GHG emissions and meets its target. To facilitate this, each climate action measure identifies implementation actions, departments responsible for implementation and monitoring, cost and savings estimates, the GHG reduction potential, a performance indicator to monitor progress, and an implementation time frame. Measure implementation is separated into three phases: near-term (by 2013), mid-term (2014-2016), and long-term (2017-2020).

In order to ensure that measures are implemented and their progress is monitored, upon adoption of the CAP the City will establish a CAP Coordinator who will provide essential CAP oversight and coordination of a multi-departmental CAP Implementation Team comprised of key staff in each selected department. The CAP Implementation Team will meet at least one time per year to assess the status of CAP efforts. The City's CAP Coordinator will be responsible for developing an annual progress report to the City Council that identifies the implementation status of each measure, evaluates achievement of or progress toward performance indicators (where applicable), assesses the effectiveness of various measures and actions included in the CAP, and recommends adjustments to measures or actions, as needed. To evaluate the performance of the CAP as a whole, the City will update the community and municipal GHG emissions inventories every five years, using the most up-to-date calculation methods, data, and tools.

ENDNOTES

[1] California Air Resources Board (CARB). (December 2008). *Climate Change Scoping Plan*. Retrieved from http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm

[2] Local Governments for Sustainability (ICLEI). (2009). *City of Vista Greenhouse Gas Emissions Inventory*. As updated by Rincon Consultants, Inc. and Fehr & Peers. (2011).

CHAPTER 1

INTRODUCTION

1.0 Introduction

Although climate change is a global issue, the State of California recognizes that it poses risks to the public health, environment, economic well-being, and natural resources of California, and has taken an active approach to address climate change through the adoption of legislation and policies. In 2005, the governor issued Executive Order S-3-05 to reduce statewide GHG emissions to 1990 levels by 2020 (approximately 15 percent below 2005 levels) and to 80 percent below 1990 levels by 2050. Enactment of several related pieces of climate action legislation followed, including AB 32 (the Global Warming Solutions Act of 2006), which codified the 2020 target, and SB 97 (the CEQA and GHG Emissions bill of 2007), which requires lead agencies to analyze GHG emissions and mitigate climate change impacts under CEQA. These laws together create a framework for GHG emissions reductions and identify local governments as having a vital role to play in assisting the State in meeting these mandates. The AB 32 Scoping Plan, prepared by CARB pursuant to AB 32, notes that local governments have broad influence and, in some cases, exclusive authority over activities that result in GHG emissions through their planning and permitting processes, local ordinances, outreach and education efforts, and municipal operations. In recognition of the important role local governments will play in the successful implementation of AB 32, the AB 32 Scoping Plan recommends a GHG emission reduction target for local governments of 15 percent below 2005 levels by 2020 to match the statewide reduction target and to mitigate their impacts on climate change.

Recognizing the important role and responsibility that local governments have in reducing GHG emissions and mitigating their potential climate change impacts, General Plan 2030 and the associated PEIR direct the City to prepare and implement this CAP. This chapter describes the purpose, scope, and content of Vista's CAP. It also discusses the relationship of the CAP to General Plan 2030 and the PEIR. In addition, this chapter summarizes the scientific and regulatory framework under which this plan has been developed.

1.1 Purpose and Scope

The City's CAP is a long-range plan to reduce GHG emissions from community activities and municipal operations within Vista to support the State's efforts under AB 32 and to mitigate the community's contribution to global climate change. Specifically, the CAP does the following:

- Summarizes the results of the *City of Vista Greenhouse Gas Emissions Inventory*,[1] which identifies the major sources and quantities of GHG emissions produced within Vista and forecasts how these emissions may change over time.
- Identifies the quantity of GHG emissions that Vista will need to reduce to meet the State-recommended target of 15 percent below 2005 levels by the year 2020.
- Sets forth municipal and community GHG reduction measures, including performance standards which, if implemented, would collectively achieve the specified emission reduction target.
- Identifies proactive strategies that can be implemented to help Vista prepare for anticipated climate change impacts.
- Sets forth procedures to implement, monitor, and verify the effectiveness of the CAP measures and adapt efforts moving forward.

In addition to reducing Vista's GHG emissions consistent with AB 32 and mitigating the community's contribution to global climate change, implementation of the CAP will help achieve multiple community goals, such as lowering energy costs, reducing air pollution, supporting local economic development, and improving public health and quality of life. The CAP may also be utilized to tier and streamline the analysis of GHG emissions of future development within Vista pursuant to State CEQA Guidelines 15152, 15183 and 15183.5 (refer to Section 1.5, *Relationship to CEQA*).

1.2 Content

The CAP is organized into the following chapters:

1.0 Introduction – describes the purpose, scope, and content of Vista's CAP. It also discusses the relationship of the CAP to General Plan 2030 and CEQA. In addition, this chapter summarizes the scientific and regulatory framework under which this plan has been developed.

2.0 Greenhouse Gas Emissions and Reduction Target – identifies the sources of GHG emissions in Vista, quantifies emissions for a baseline year (2005), and forecasts how emission levels would change through 2020. This chapter also quantifies the GHG emissions reduction target for the year 2020.

3.0 Climate Action Measures – organizes the CAP measures into six focus areas: municipal operations, energy, transportation and land use, solid waste, community education and outreach, and adaptation. Each GHG reduction measure is presented with implementation actions, estimated GHG reductions in 2020, estimated cost and future savings, and potential implementation resources and partners.

4.0 Implementation and Monitoring – sets forth procedures to implement and monitor the individual CAP measures, evaluate the CAP's performance, and amend the plan if it is not achieving targeted reduction levels. It also identifies potential sources of funding to implement the CAP.

1.3 Public Participation

City staff and its consultants worked with members of the community, elected officials, and representatives from various departments within the City to develop the CAP. The public outreach program involved two scheduled community meetings that introduced the project, reviewed the results of the GHG emissions inventory, and gathered ideas for the document. In addition, an online survey was posted on the City's website from early November 2011 to late January 2012 which provided community members and stakeholders the opportunity to evaluate preliminary CAP measures and suggest additional ideas. Public comment was also considered during public hearings on the CAP at Planning Commission and City Council meetings. Regular updates were provided throughout the course of the project to the City's Planning Commission and City Council to keep them apprised of the CAP's progress.

1.4 Relationship to General Plan 2030

General Plan 2030, adopted in 2012, expresses the community's vision for the future and provides a basis for decision-making for land use actions. It consists of an organized set of goals and policies that guide both the distribution of land uses and the way land is developed (or redeveloped) and used. In regards to climate

change, General Plan 2030 identifies RCS Goal 2 to reduce GHG emissions from community activities and municipal facilities and operations within Vista to support the State's efforts under AB 32 and to mitigate the community's contribution to global climate change. To achieve this goal, RCS Policy 2.1 directed the City to prepare and implement this CAP, and includes the following language:

> *RCS Policy 2.1: Prepare and implement a CAP within 24 months of adoption of the General Plan that, through its full implementation, will reduce GHG emissions from community activities and municipal operations by at least 15 percent by 2020 compared to the 2005 baseline community emissions inventory (including any reductions required by the CARB under AB 32).*

In addition to fulfilling RCS Policy 2.1 of General Plan 2030, this CAP incorporates and/or builds on many of the General Plan 2030 policies that would reduce Vista's GHG emissions. Appendix D lists the General Plan 2030 policies that are consistent with each of the climate action measures set forth in Chapter 3.

1.5 Relationship to CEQA

CEQA requires every community to analyze and disclose how its general plan update may affect GHG emissions and global climate change and implement measures to mitigate those impacts. Many policies within the Resource Conservation and Sustainability, Land Use and Community Identity, and Circulation Elements of General Plan 2030 would act to reduce GHG emissions within Vista. However, at the time General Plan 2030 and the associated PEIR were prepared, it was unknown whether or not the policies of General Plan 2030 were sufficient to reduce Vista's GHG emissions to a level consistent with AB 32. Accordingly, the General Plan 2030 PEIR identified Mitigation Measure M-CC-1: CAP Implementation, which calls for the development and implementation of this CAP to mitigate GHG emissions and climate change impacts associated with buildout of General Plan 2030, and includes the following language:

> *M-CC-1: CAP Implementation. In compliance with RSC Policy 2.1, the city shall implement a quantified CAP within two years. The CAP shall apply the discussions in the EIR under "Considerations for Implementing the Climate Action Plan" discussed under Section 4.4.4.4.1. At a minimum, the CAP shall:*
>
> - *Identify a quantifiable GHG emissions reduction target on projected 2020 business-as-usual emissions in the city using currently accepted methods.*
> - *Identify and prioritize potential reduction measures and policies to achieve the city's GHG emissions target, and quantitatively and qualitatively analyze the reduction potential and implementation costs of selected measures to a level that is 15 percent below recent (2005) levels by 2020.*
> - *Identify proactive strategies that can be implemented to prepare for potential impacts of climate change on Vista's economy, natural ecosystems, and community health.*
> - *Identify an achievable implementation schedule, establish a monitoring system, and identify funding sources for implementation of the CAP through 2020.*

According to the California Natural Resources Agency and the State's Office of the Attorney General, GHG emissions may be best analyzed and mitigated at a programmatic level (i.e., GHG reduction/climate action plan).[2] In 2009, the California Natural Resources Agency amended the State CEQA Guidelines to add a new

provision, Section 15183.5, which provides a framework for programmatic greenhouse gas emissions reduction plans. The State CEQA Guidelines, Section 15183.5, states a plan for the reduction of GHG emissions should:

- Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;
- Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable;
- Identify and analyze the greenhouse gas emissions resulting from sources in the community;
- Identify a suite of specific, enforceable measures that, collectively, will achieve the emissions targets;
- Establish a mechanism to monitor the plan's progress and to require amendment if the plan is falling short; and
- Be adopted in a public process following environmental review.

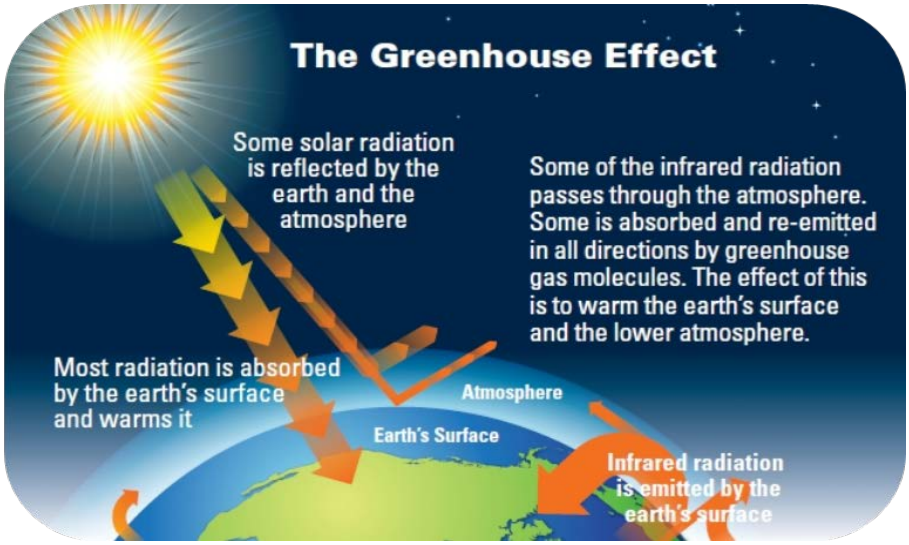
This CAP was developed to be consistent with State CEQA Guidelines Section 15183.5 to mitigate emissions and climate change impacts associated with General Plan 2030. This approach also allows for the streamlined CEQA review of individual projects. When emissions are adequately addressed at the plan level in a CAP, a lead agency may determine that projects that are consistent with the CAP will not have significant GHG-related impacts, thereby shortening the CEQA process, which can save time and money for these projects.

1.6 Scientific Background

In order to make meaningful and effective decisions regarding GHG reductions, it is important to understand the science under which this CAP has been developed. This section provides a brief introduction to the scientific research efforts to understand how climate change occurs and its implications.

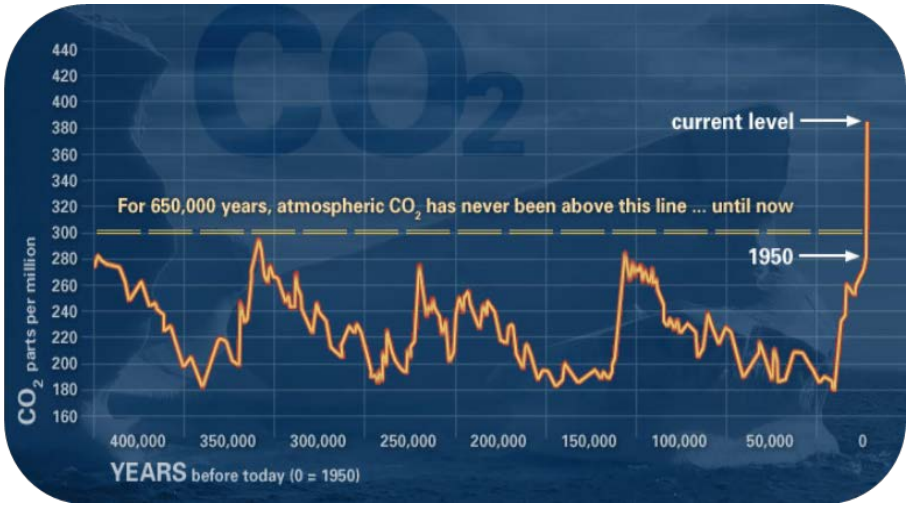
Global climate change refers to changes in the average climatic conditions on Earth as a whole, including changes in temperature, wind patterns, precipitation, and storms. Global warming, a related concept, is the observed increase in average temperature of the Earth's surface and atmosphere caused by increased GHG emissions, which can contribute to changes in global climate patterns. GHGs, such as water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and ozone (O_3), are gases in the Earth's atmosphere that play a critical role in determining the Earth's surface temperature. Specifically, GHGs allow high-frequency solar radiation to enter the Earth's atmosphere, but trap the low frequency, long wave energy which is radiated back from the Earth to space, resulting in a warming of the atmosphere. The trapping of heat at the Earth's surface is known as the "greenhouse effect" (refer to **Figure 1-1**, *the Greenhouse Effect*).

Figure 1-1: The Greenhouse Effect


The Greenhouse Effect
Some solar radiation is reflected by the earth and the atmosphere
Some of the infrared radiation passes through the atmosphere. Some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the earth's surface and the lower atmosphere.
Most radiation is absorbed by the earth's surface and warms it
Atmosphere
Earth's Surface
Infrared radiation is emitted by the earth's surface

GHGs are the result of both natural and anthropogenic activities. The consumption of fossil fuels for power generation and transportation, forest fires, decomposition of organic waste, and industrial processes are the primary sources of GHG emissions. Without human intervention, the Earth maintains an approximate inter-annual balance between the emission of GHGs into the atmosphere and its storage in oceans and terrestrial ecosystems. Following the industrial revolution, however, increased combustion of fossil fuels (e.g., gasoline, diesel, coal, etc.) and other industrial processes have contributed to the rapid increase in atmospheric levels of GHGs (refer to **Figure 1-2**).[3] This increase in GHGs correlates with the recent increase in global average temperature (which has risen approximately 1.4°F since the early 20th century).[4]

Figure 1-2: Historic Fluctuations and Recent Increases in Atmospheric Carbon Dioxide



This graph, based on the comparison of atmospheric samples contained in ice cores and more recent direct measurements, provides evidence that atmospheric CO_2 has increased since the Industrial Revolution.[5]

The principal GHGs that enter the atmosphere as a result of human activities are discussed below.

- **Carbon dioxide (CO_2)** is released into the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., cement production) and deforestation. Carbon dioxide is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- **Methane (CH_4)** is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from agricultural practices, such as the raising of livestock, and by the decomposition of organic waste in landfills.
- **Nitrous oxide (N_2O)** is emitted during agricultural and industrial activities, as well as during the burning of fossil fuels and solid waste.
- **Fluorinated gases** (i.e., hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) are emitted from a variety of industrial processes (e.g., aluminum production) and used in commercial, industrial, and consumer products (e.g., automobile air conditioners and refrigerants). These gases are typically emitted in smaller quantities but are generally very strong GHGs.

Each GHG has a different potential for trapping heat in the atmosphere, called global warming potential. For example, one pound of methane has 21 times more heat capturing potential than one pound of carbon dioxide. To simplify reporting and analysis of GHGs, GHG emissions are typically reported in metric tons of carbon dioxide equivalent (MT CO_2e) units. When dealing with an array of emissions, the gases are converted to their carbon dioxide equivalents for comparison purposes. The global warming potentials for common GHGs are shown in **Table 1-1**.

Table 1-1: Global Warming Potential of GHGs

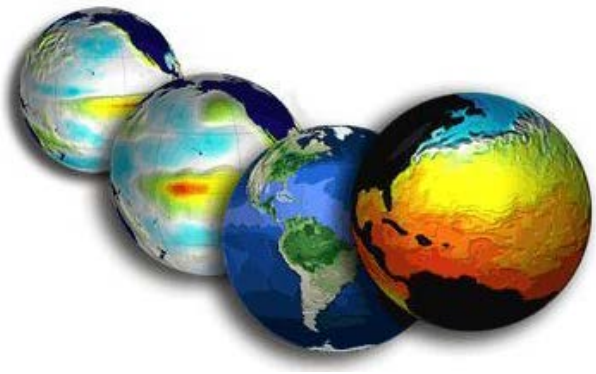
Greenhouse Gas	Global Warming Potential
Carbon Dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310
Hydroflourocarbons (HFCs)	140-11,700
Perflourocarbons (PFCs)	6,500-9,200
Sulfur Hexaflouride (SF_6)	23,900

Notes: Each of the GHGs listed above differs in its ability to absorb heat in the atmosphere, or in its global warming potential. The values presented above are based on the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report and United Nations Framework Convention on Climate Change reporting guidelines.[6] Although the IPCC Fourth Assessment Report presents different estimates, the current inventory standard relies on the Second Assessment Report's intensity factors to comply with reporting standards and consistency with regional and national inventories.[7]

1.7 Climate Change Impacts

Increases in the globally averaged atmospheric concentration of GHGs will cause the lower atmosphere to warm, in turn inducing a myriad of changes to the global climate system. These large-scale changes will have unique and potentially severe impacts in the western United States, California, and the San Diego

region. Current research efforts coordinated through the CARB, California Energy Commission, California EPA, University of California system, and other entities are examining the specific changes to California's climate that will occur as the Earth's surface warms.



The best available climate models indicate that climate change could impact the natural environment in California in the following ways, among others:[8]

- Rising sea levels along the California coastline, particularly in San Francisco Bay and the San Joaquin Delta caused by ocean expansion and glacier melt
- Extreme-heat conditions, such as heat waves and very high temperatures, which could last longer and become more frequent
- An increase in heat-related human deaths, infectious diseases, and a higher risk of respiratory problems caused by deteriorating air quality
- Reduced snow pack and stream flow in the Sierra Nevada Mountains, affecting winter recreation and water supplies
- Potential increase in the severity and historical pattern of winter storms, affecting peak stream flows and flooding
- Changes in growing season conditions that could affect California agriculture, causing variations in crop quality and yield
- Changes in distribution of plant and wildlife species brought about by changes in temperature, competition from colonizing species, changes in hydrologic cycles, changes in sea levels, and other climate-related effects

1.7.1 IMPLICATIONS FOR VISTA

Rising temperatures affect local and global climate patterns, and these changes are forecasted to manifest themselves in a number of ways that may impact the San Diego region. In 2008, a vulnerability assessment entitled the *San Diego Regional Focus 2050 Study* (Focus 2050) was prepared by the Scripps Institution of Oceanography, Science Applications International Corporation, and the Environmental and Sustainability Initiative at University of California, San Diego, and was published by the San Diego Foundation.[9] Focus 2050 explored what the San Diego Region may look like in 2050 if current climate trends continue. The range of potential impacts presented in the Focus 2050 are based on projections of climate change on the San Diego region using three climate change models and two emissions scenarios drawn from those used by the IPCC.

According to Focus 2050, average annual temperatures are projected to rise between 1.5°F and 4.5°F by 2050, with higher increases in summer. Rising temperatures, along with a growing population, will likely create a variety of challenges for the San Diego Region, including:

- **Heat Waves** – More frequent, longer, and more-extreme heat waves, thereby increasing energy demand and bringing about public health threats in the process
- **Air Quality** – Increased production of air pollutants, especially ozone, due to higher air temperatures, which can exacerbate respiratory and cardiovascular diseases
- **Wildfires** – Increased wildfire frequency, intensity, and duration, thereby threatening public health and plant and animal species
- **Water Supply** – Decreased water supply, more frequent drought conditions, and increased demand with implications for the community and environment
- **Infectious Disease** – Increase risk of contracting infectious diseases from mosquitoes, ticks, and rodents, such as West Nile Virus and Hantavirus
- **Biodiversity and Habitats** – Loss of plant and animal species, and their habitats
- **Agriculture** – Decreased production from crops sensitive to temperature increases and decreased water supply, and increase in various pests
- **Energy Supply** – More frequent power outages due to increased electricity demand

1.8 Regulatory Setting

This section summarizes the federal, state, and regional legislation, regulations, policies, and plans that have guided the preparation and development of this CAP.

1.8.1 FEDERAL

Clean Air Act. The U.S. Environmental Protection Agency (EPA) is the federal agency responsible for implementing the Clean Air Act. The U.S. Supreme Court ruled in its decision in *Massachusetts et al. v. Environmental Protection Agency et al.*,[10] issued on April 2, 2007, that carbon dioxide is an air pollutant as defined under the Clean Air Act and that the U.S. EPA has the authority to regulate emissions of GHGs as pollutants. In 2011, the U.S. EPA began regulating GHG emissions from new power plants and refineries through a set of New Source Performance Standards. These regulations will be finalized and applied to all new stationary sources in 2012.

Energy Independence and Security Act. The Energy Independence and Security Act of 2007 includes several provisions that will increase energy efficiency and the availability of renewable energy, which in turn will reduce GHG emissions. First, the Act sets a Renewable Fuel Standard that requires fuel producers to use at least 36 billion gallons of biofuel by 2022. Second, it increased Corporate Average Fuel Economy (CAFE) Standards to require a minimum average fuel economy of 35 miles per gallon for the combined fleet of cars and light trucks by 2020. Third, it includes a variety of new standards for lighting and for residential and commercial appliance equipment, including residential refrigerators, freezers, refrigerator-freezers, metal halide lamps, and commercial walk-in coolers and freezers.

1.8.2 STATE OF CALIFORNIA

The State has been proactive in working to reduce emissions and has a long history of leadership in addressing energy and climate issues spanning the last 40 years. In 1988, AB 4420 (Sher, Chapter 1506,

Statutes of 1988) designated the California Energy Commission as the lead agency for climate change issues in California. Since that time, numerous initiatives in California have addressed climate change and energy efficiency, the majority of legislation passed between 2000 and now. These initiatives have strengthened the ability of entities in California to engage in accurate data collection and have created targets and regulations that will directly lead to reductions in GHG emissions. These initiatives are described below.

Executive Order S-3-05. Executive Order S-3-05, issued in 2005, was the first comprehensive state policy to address climate change. It established ambitious GHG reduction targets for the State: reduce GHG emissions to 2000 levels by 2010, to 1990 levels by 2020 and to 80 percent below 1990 levels by 2050. This Executive Order is binding only for State agencies and has no force of law for local governments. However, S-3-05 is important for two reasons. First, it obligated State agencies to implement GHG emission reduction strategies. Second, the signing of the Order sent a clear signal to the Legislature about the framework and content for legislation to reduce GHG emissions as a necessary step toward climate stabilization.

Assembly Bill 32 (California Global Warming Solutions Act of 2006). AB 32 codified the State's 2020 GHG emissions target by directing the CARB to reduce California's statewide emissions to 1990 levels by 2020. AB 32 also required the CARB to develop a policy plan for reaching the 2020 emissions target and to adopt and enforce regulations to implement the plan. The resulting AB 32 Scoping Plan was adopted by the CARB in December 2008. Key elements of the plan for achieving the 2020 target include:

- Adopting and implementing measures pursuant to existing state laws and policies, including California's goods movement measures and the Low Carbon Fuel Standard
- Expanding energy efficiency programs and green building practices
- Reducing methane emissions at landfills
- Developing a California cap-and-trade program
- Establishing and seeking to achieve reduction targets for transportation-related GHG emissions
- Increasing waste diversion, composting, and commercial recycling toward zero-waste
- Strengthening water efficiency programs
- Preserving forests that sequester carbon dioxide

Although the AB 32 Scoping Plan does not identify specific reductions for local governments, it identifies overall reductions from local government operations and land use decisions as a strategy to meet the 2020 target. The AB 32 Scoping Plan states that land use planning and urban growth decisions will play an important role in the State's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions. It further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. However, the AB 32 Scoping Plan stopped short of identifying mandatory targets for local government compliance. Instead, it encourages local governments to adopt a target for municipal and community emissions that parallels the State's AB 32 target and reduce emissions by approximately 15 percent from current levels by 2020.

Senate Bill 97. SB 97 (2007) established that GHG emissions and the effects of GHG emissions are appropriate subjects for CEQA analysis and required the Governor's Office of Planning and Research to

develop guidelines to analyze GHG impacts under CEQA. The guidelines were adopted on December 31, 2009, requiring lead agencies to analyze GHG emissions and the effects of GHG emissions under section 15064.4 during CEQA review.

Assembly Bill 1493 (Pavley Regulations). AB 1493 (referred to as Pavley I) (2002) directed the CARB to develop and adopt standards for vehicle manufacturers to reduce GHG emissions coming from passenger vehicles and light-duty trucks at a "maximum feasible and cost effective reduction" by January 1, 2005. Pavley I took effect for model years starting in 2009 to 2016 and Pavley II will cover 2017 to 2025. Fleet average emission standards would reach 22 percent reduction by 2012 and 30 percent by 2016.

Executive Order S-1-07 (Low Carbon Fuel Standard). This 2007 order requires fuel providers to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020.

Senate Bill 375. SB 375 (2008) supports implementation of AB 32 by aligning regional transportation planning efforts with land use and housing allocations in order to reduce transportation-related GHG emissions. Specifically, SB 375 directed the CARB to set regional GHG emissions targets for passenger vehicles and light trucks for the years 2020 and 2035 for each Metropolitan Planning Organization (MPO) region, which were adopted in February 2011. For the San Diego Association of Governments (SANDAG), Vista's MPO region, the CARB issued a seven percent per capita reduction target from 2005 levels by 2020 and a 13 percent per capita reduction target by 2035. These targets apply to the SANDAG region as a whole, and not to individual cities or subregions. In 2005, GHG emissions from passenger vehicles in the San Diego region were approximately 26.0 tons CO_2e per capita.[11] Therefore, SANDAG must reduce emissions to at least 24.2 tons CO_2e per capita by 2020 and 22.6 tons CO_2e per capita by 2035 to meet the target. SANDAG's 2050 Regional Transportation Plan and Sustainable Communities Strategy, adopted in 2011, detail how the region will meet the target (refer to the discussion of SANDAG's 2050 Regional Transportation Plan and Sustainable Communities Strategy in Section 1.8.3 below).

Senate Bill 1078, Senate Bill 107, and Senate Bill 2X (Renewables Portfolio Standard). Established in 2002 under SB 1078, and accelerated in 2006 under SB 107, California's Renewables Portfolio Standard required investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources by at least one percent of their retail sales annually, until they achieved 20 percent by 2010. SB 2X raises the target from the current 20 percent, requiring private and public utilities to obtain 33 percent of their electricity from renewable energy sources by 2020.

Senate Bill 1368. SB 1368 (2006) directs the California Energy Commission and the California Public Utilities Commission to adopt a performance standard for GHG emissions for the future electricity used in California, regardless of whether it is generated in-state or purchased from other states.

Assembly Bill 811. AB 811 (2008) authorizes California cities and counties to designate districts within which willing property owners may enter into contractual assessments to finance the installation of renewable energy generation and energy efficiency improvements that are permanently fixed to the property. These financing arrangements would allow property owners to finance renewable energy generation and energy efficiency improvements through low-interest loans that would be repaid as an item on the property owner's property tax bill.

California Green Building Code. The California Green Building Code (2008) (the CALGreen Code) is the statewide green building code, which was developed to provide a consistent approach for green building within California. It lays out minimum requirements for newly constructed buildings in California, which will

reduce GHG emissions through improved efficiency and process improvements. It requires builders to install plumbing that cuts indoor water use by as much as 20 percent, divert 50 percent of construction waste from landfills to recycling, and use low-pollutant paints, carpets, and floors.

Senate Bill 1881 (Water Conservation in Landscaping Act). SB 1881 (2006) requires cities and counties to adopt and implement a water-efficient landscape ordinance, limiting the amount of water used for landscaping purposes.

Senate Bill 7. SB 7 (2009) requires all water suppliers to increase water use and sets an overall goal of reducing per capita urban water use by 20 percent by 2020.

Senate Bill 407. SB 407 (2009) requires that water-conserving plumbing fixtures replace non-compliant fixtures as a condition of property transfers or improvements in single-family residential homes by 2017 and in multi-family and commercial buildings by 2019.

Assembly Bill 939 (The Integrated Waste Management Act of 1989). AB 939 requires cities and counties to divert at least 50 percent of their solid waste stream through source reduction, recycling, and/or composting activities.

Assembly Bill 341. AB 341 (2011) establishes a new policy goal of the State of California to divert at least 75 percent of solid waste generated by the year 2020. It also provides for mandatory commercial and multi-family residential recycling, and requires cities and counties to add a commercial and multi-family residential recycling element to their existing resource reduction plans.

1.8.3 REGIONAL

San Diego Air Pollution Control District

The San Diego Air Pollution Control District (SDAPCD) has primary responsibility for the development and implementation of rules and regulations designed to attain the National Ambient Air Quality Standards and California Ambient Air Quality Standards, as well as the permitting of new or modified sources, development of air quality management plans, and adoption and enforcement of air pollution regulations within San Diego County, which is contiguous with the San Diego Air Basin. The SDAPCD regulates most air pollutant sources, except for mobile sources, which are regulated by the CARB or California EPA. State and local government projects, as well as projects proposed by the private sector, are subject to SDAPCD requirements if the sources are regulated by the SDAPCD.

The AB 32 Scoping Plan does not provide an explicit role for local air districts in implementing AB 32, but it does state that the CARB will work actively with air districts in coordinating emissions reporting, encouraging and coordinating GHG reductions, and providing technical assistance in quantifying reductions. The ability of air districts to control emissions (both criteria pollutants and GHGs) is provided primarily through permitting as well as through their role as CEQA lead or commenting agency, the establishment of CEQA thresholds, and the development of analytical requirements for CEQA documents. To date, the SDAPCD has not adopted any specific rules related to GHGs or developed specific thresholds of significance with regards to addressing the GHG emissions in CEQA documents.

San Diego Association of Governments

SANDAG is the local Council of Governments with responsibility for regional planning for San Diego County. SANDAG's planning efforts address regional issues relating to transportation, land use and urban form, housing, environment, economic development, regional public facilities, and climate change. Plans and programs that SANDAG has adopted that support GHG emissions reductions in Vista are described below.

Regional Comprehensive Plan. The Regional Comprehensive Plan, last updated in 2004, serves as the long-term planning framework for the San Diego region.[12] It sets forth a regional strategy for smart growth and sustainable development in the San Diego region.

Smart Growth Concept Map. The Smart Growth Concept Map is a key component to implementing the Regional Comprehensive Plan, as it identifies locations within the region that can support smart growth and transportation investments. It served as the foundation for refining the regional transit network and identifying other transportation needs in the development of the Regional Transportation Plan. It also serves to determine eligibility to participate in the Smart Growth Incentive Program funded through *TransNet*. The Smart Growth Concept Map contains almost 200 existing, planned, or potential smart growth locations, including five within Vista.

2050 Regional Transportation Plan and Sustainable Communities Strategy. The Regional Transportation Plan, most recently updated in 2011, serves as the primary transportation element of the Regional Comprehensive Plan, and helps position the region to achieve smarter, more sustainable growth that meets the transportation needs of the growing population and changing region. The Regional Comprehensive Plan calls upon SANDAG to update the regional transportation plan and related programming documents in a way that both maximizes opportunities for local governments to implement smart growth and ensures that the design and implementation of regional transportation facilities support local smart growth. The 2050 Regional Transportation Plan lays out a plan for investing an estimated $214 billion in local, state, and federal transportation funds expected to come into the region over the next 40 years.

Along with the 2050 Regional Transportation Plan, SANDAG adopted the Sustainable Communities Strategy. The Sustainable Communities Strategy details how the region will reduce GHG emissions from passenger vehicles and light trucks by 14 percent below 2005 levels by 2020 and 13 percent below 2005 levels by 2035 to State-mandated levels, pursuant to SB 375 (refer to the discussion of SB 375 in Section 1.8.2 above).

ENDNOTES

[1] Local Governments for Sustainability (ICLEI). (2009). *City of Vista Greenhouse Gas Emissions Inventory*. As updated by Rincon Consultants, Inc. and Fehr & Peers. (2011).

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[11] San Diego Association of Governments (SANDAG). (2011). *Final 2050 Regional Transportation Plan*. Retrieved from http://www.sandag.org/uploads/2050RTP/F2050rtp_all.pdf

[12] San Diego Association of Governments (SANDAG). (June 2004). *Regional Comprehensive Plan*. Retrieved from http://www.sandag.org/index.asp?publicationid=1094&fuseaction=publications.detail

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CHAPTER 2

GHG EMISSIONS AND REDUCTION TARGET

2.0 GHG Emissions and Reduction Target

A GHG emissions inventory identifies the major sources and quantities of GHG emissions produced by community activities and municipal facilities and operations within a jurisdiction's boundaries for a given year. Estimating GHG emissions enables local governments to establish an emissions baseline, track emissions trends, identify the greatest sources of GHG emissions within their jurisdiction, set targets for future reductions, and create an informed mitigation strategy based on this information.

This chapter summarizes the results of the *City of Vista Greenhouse Gas Emissions Inventory* (GHG Emissions Inventory) (refer to Appendix A).[1] The GHG Emissions Inventory includes a 2005 baseline inventory of GHG emissions from community activities and municipal facilities and operations within Vista, and a 2020 business-as-usual forecast of how emissions in Vista would change if no further actions are implemented to reduce those emissions. This chapter also identifies a GHG emissions reduction target for the year 2020.

2.1 2005 Baseline GHG Emissions

This section describes the methodology used to complete the 2005 baseline GHG Emissions Inventory of municipal operations and community activities, and summarizes the results.

2.1.1 METHODOLOGY

The baseline GHG Emissions Inventory calculates emissions that occurred within the City's jurisdictional boundary in the year 2005. It includes a community baseline inventory that details the sources and quantities of GHG emissions resulting from activities from the Vista community as a whole, and a municipal inventory that identifies the sources and quantities of emissions resulting from the City of Vista's operations and facilities. The municipal inventory is a subset of the community inventory, meaning that the city government's emissions are included within the community inventory.

The community inventory is divided into five sectors, or sources of emissions: transportation, residential energy use, commercial and industrial energy use, solid waste, and wastewater. The municipal inventory provides a more detailed analysis of emissions resulting from City-owned or -operated buildings, fleet vehicles, and lighting; water and sewage transport; City-generated solid waste; and employee commute travel.

The community inventory follows the *International Local Government GHG Emissions Analysis Protocol* (2009).[2] The municipal operations inventory follows the *Local Government Operations Protocol* (version 1.1), which was adopted in 2010 by CARB and serves as the national standard for quantifying and reporting GHG emissions from local government operations.[3] These protocols provide standard accounting principles, boundaries, quantification methods, and procedures for reporting GHG emissions. Like all emissions inventories, this inventory must rely on the best-available data and calculation methodologies, and therefore, represents a best estimate of GHG emissions following standard protocol. As protocols are updated, as better data and calculation methodologies become available, the inventory can be updated and improved. Nevertheless, the findings of this analysis provide a solid basis upon which Vista can begin planning and taking action to reduce its GHG emissions. A detailed description of these methodologies, as well as their limitations, is provided in the GHG Emissions Inventory, located in Appendix A.[4]

2.1.2 MUNICIPAL EMISSIONS

In 2005, municipal operations generated approximately 3,865 MT CO_2e (metric tons of carbon dioxide equivalent emissions). This quantity represents approximately seven percent of Vista's total community GHG emissions (refer to Section 2.1.3). As shown in **Figure 2-1** and **Table 2-1**, fuel consumption from the City's fleet vehicles and employee commutes were the largest contributors to the City's emissions (each generating approximately 29 percent of total emissions). Emissions from electricity and natural gas used at City buildings were also a significant source of emissions (21 percent), as were emissions from electricity used for public lighting (17 percent). Emissions from government-generated solid waste (three percent) and electricity used to transport water and sewage (one percent) accounted for the remainder of the City's emissions.

Figure 2-1: Municipal GHG Emissions by Sector (2005)

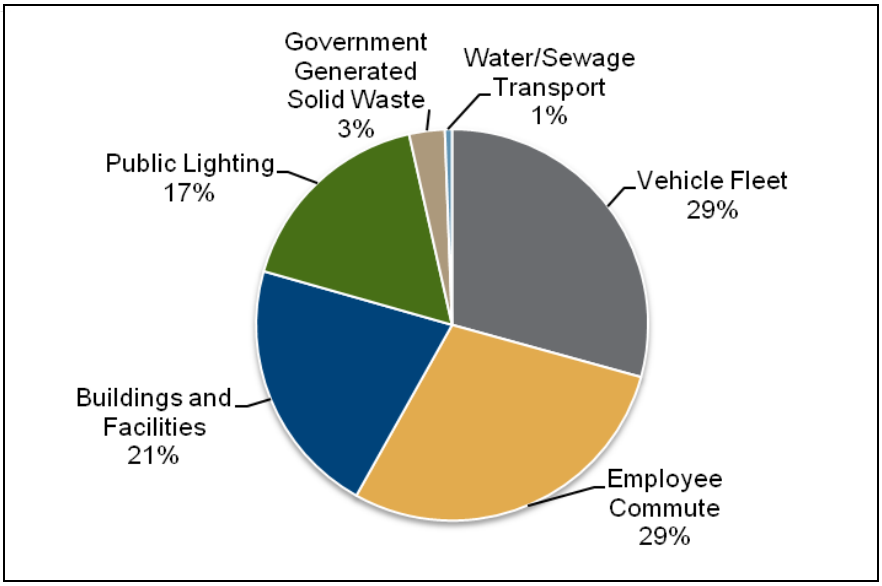


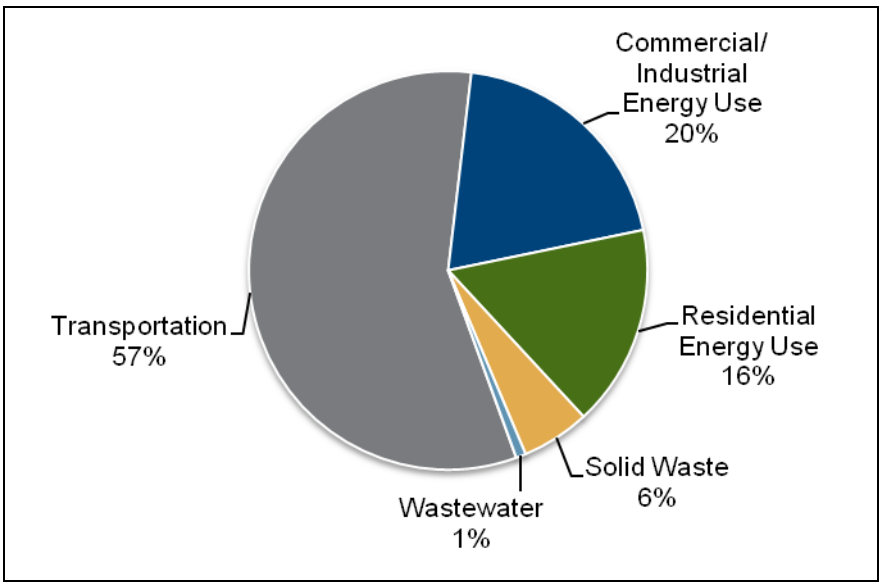
Table 2-1: Municipal GHG Emissions by Sector (2005)

Sector	Description	GHG Emissions (MT CO_2e)	Percent of Total
Vehicle Fleet	Fuel consumption and mobile refrigerants for City fleet vehicles and off-road vehicles/equipment	1,132	29%
Employee Commute	Fuel consumption for City employee commutes	1,114	29%
Buildings and Facilities	Electricity, natural gas, and diesel fuel use in City-owned or –operated buildings and facilities	823	21%
Public Lighting	Electricity used to power streetlights, traffic signal lights, and other public outdoor lighting	659	17%
Municipal Solid Waste	Landfilled solid waste generated by City operations	114	3%
Water/Sewage Transport	Electricity used for water and sewage transport resulting from City operations	23	1%
TOTAL		**3,865**	**100%**

2.1.3 COMMUNITY EMISSIONS

In 2005, the Vista community emitted approximately 547,039 MT CO_2e, as a result of activities that took place within the transportation, residential energy use, commercial and industrial energy use, solid waste, and wastewater sectors. As shown in **Figure 2-2** and **Table 2-2**, the transportation sector was the largest contributor of GHG emissions, generating approximately 314,097 MT CO_2e, or 57 percent of total 2005 emissions. Transportation sector emissions are the result of diesel and gasoline fuel used in vehicles traveling on local roads and state highways within the jurisdictional boundaries of Vista and off-road vehicles and equipment.[i] Electricity and natural gas consumption within the commercial and industrial sector was the second largest contributor, generating 108,749 MT CO_2e, or 20 percent of the total emissions. Electricity and natural gas consumption in Vista's residential sector produced 89,534 MT CO_2e, or 16 percent of total community emissions. Emissions from solid waste sent to landfills (30,310 MT CO_2e, or six percent) and wastewater (one percent, or 4,349 MT CO_2e) accounted for the remainder of community emissions.

Figure 2-2: Community GHG Emissions by Sector (2005)



[i] On-road transportation GHG emissions were derived from local jurisdiction vehicle miles traveled (VMT) data and regional vehicle and travel characteristics. The EMFAC 2007 model developed by CARB was used to calculate emissions from these VMT figures. EMFAC 2007 default values for San Diego County include regionally-specific information on the mix of vehicle classes and model years, as well as ambient conditions and travel speeds, which determine fuel efficiency. Types of emissions accounted for include: running exhaust, idle exhaust, starting exhaust, diurnal, resting loss, running loss, and hot soak. The model estimates carbon dioxide and methane emissions from these factors and inputted vehicle activity data. For additional information, refer to page XXV of Appendix A, *City of Vista Greenhouse Gas Emissions Inventory*.

Table 2-2: Community GHG Emissions by Sector (2005)

Sector	Description	GHG Emissions ($MT CO_2e$)	Percent of Total
Transportation	Fuel consumption for on-road (cars, trucks, etc.) and off-road vehicles/equipment	314,097	57%
Commercial / Industrial	Electricity and natural gas used in commercial and industrial buildings	108,749	20%
Residential	Electricity and natural gas used in residences	89,534	16%
Solid Waste	Solid waste generated and sent to landfills	30,310	6%
Wastewater	Treatment of wastewater	4,349	1%
TOTAL		**547,039**	100%

2.2 2020 Forecast

2.2.1 METHODOLOGY

The GHG emissions forecast provides a "business-as-usual estimate," or scenario, of how emissions will change in the year 2020 if consumption trends and behavior continue as they did in 2005, absent any new federal, state, regional, or local policies or actions that would reduce emissions. The year 2020 was selected for the forecast in order to maintain consistency with AB 32.

The GHG emissions forecast is based on projected growth trends in population, employment, households, and vehicle miles traveled. The forecast relies on the SANDAG 2050 Regional Growth Forecast (2010) for year 2020 population, employment, and household projections and the SANDAG 2030 San Diego Regional Transportation Plan (2007) for the year 2020 vehicle miles traveled projection, which are consistent with growth projections used in General Plan 2030. The forecast is based on the assumption that the number of drivers, electricity and natural gas consumption, solid waste tonnage, and wastewater generation will increase over time in proportion to population, jobs, households, and vehicle miles traveled. **Table 2-3** shows the growth assumptions used to determine the community emissions growth for each sector by 2020.

Table 2-3: Vista's Growth Assumptions

Growth Indicator	2005	2020	Sector Applied to
Population	93,926	100,016	Solid Waste, Wastewater
Households	29,506	30,232	Residential
Vehicle Miles Traveled	1,522,798	1,860,023	Transportation
Employment	42,762	44,693	Commercial / Industrial

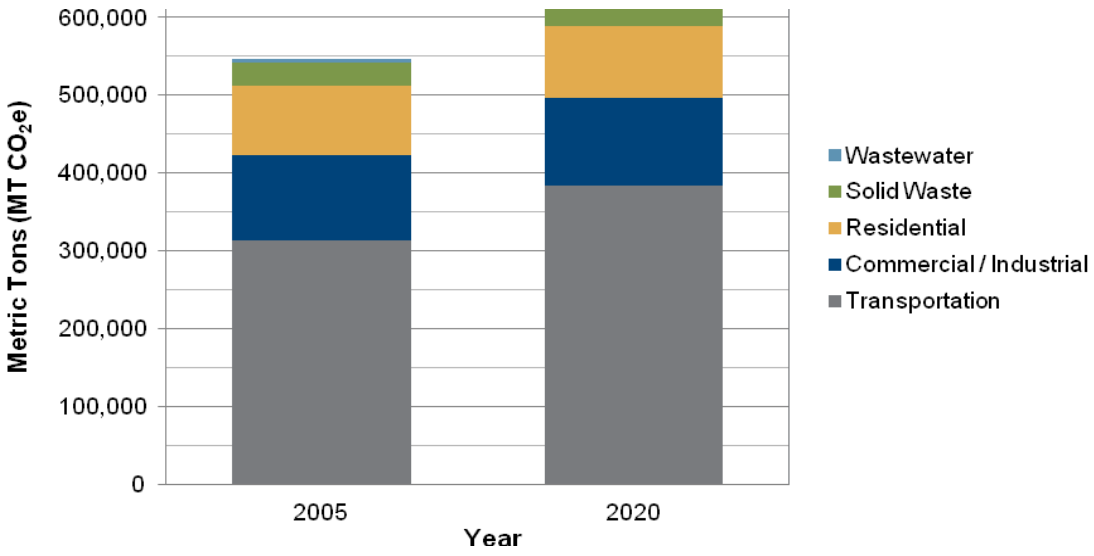
2.2.2 FORECAST

Under a business-as-usual scenario, Vista's GHG emissions are projected to grow by approximately 14 percent by the year 2020, from 547,039 MT CO_2e to 625,957 MT CO_2e. Emissions associated with the transportation sector are projected to experience the highest level of growth (22 percent). Emission increases for the other sectors will range from two to six percent. **Table 2-4** and **Figure 2-3** show the results of the forecast.

Table 2-4: 2020 Business-As-Usual GHG Emissions Forecast

Sector	2005 (MT CO_2e)	2020 (MT CO_2e)	Percent Change from 2005 to 2020
Transportation	314,097	383,654	22%
Commercial / Industrial	108,749	113,660	5%
Residential	89,534	91,737	2%
Solid Waste	30,310	32,275	6%
Wastewater	4,349	4,631	6%
TOTAL	**547,039**	**625,957**	**14%**

Figure 2-3: 2020 Business-As-Usual GHG Emissions Forecast



2.3 Incorporation of State Reductions into Forecast

The AB 32 Scoping Plan identifies several State measures that are approved, programmed, and/or adopted and would reduce GHG emissions within Vista. These State measures require no additional local action. Therefore, these measures were incorporated into the forecast and reduction assessment to create an "adjusted business-as-usual scenario," which provides a more accurate picture of future emissions growth

and the responsibility of the City once State measures to reduce GHG emissions have been implemented. A brief description of each of these measures is provided below and the calculation details are located in Appendix B, Table B-2 of this document. **Table 2-5** on page 2-7 summarizes the reduction in local emissions that would result. Under the adjusted business-as-usual scenario GHG emissions are projected to decrease approximately 10 percent below 2005 baseline emissions levels by the year 2020, from 547,039 MT CO_2e to 492,170 MT CO_2e. This is 21 percent lower than the business-as-usual scenario of 625,957 MT CO_2e.

Clean Car Standards, AB 1493 (Pavley)

Signed into law in 2002, AB 1493 requires carmakers to reduce GHG emissions from new passenger cars and light trucks beginning in 2011. Regulations were adopted by the CARB in 2004 and took effect in 2009 when the USEPA issued a waiver confirming California's right to implement the bill. CARB anticipates that the Pavley standards will reduce GHG emissions from new California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016, while simultaneously improving fuel efficiency and reducing motorists' costs.

Low Carbon Fuel Standard (LCFS)

The LCFS is a flexible performance standard designed to accelerate the availability and diversity of low-carbon fuels by taking into consideration the full life-cycle of GHG emissions. As part of the AB 32 Scoping Plan, the LCFS is expected to reduce the carbon intensity of transportation fuels by 10 percent. However, a portion of the emission reductions required from the LCFS would be achieved over the lifecycle of transportation fuel production rather than from mobile-source emission factors. Based on CARB's estimate, the LCFS would result in an 8.2 percent reduction of transportation sector GHG emissions compared to the 2020 business-as-usual scenario.

Passenger Vehicle Efficiency

The AB 32 Scoping Plan identifies several measures that would further reduce tailpipe GHG emissions from passenger vehicles by increasing vehicle efficiency. These measures require proper tire inflation and the use of solar-reflective automotive paint and window glazing (cool car standards). The AB 32 Scoping Plan estimates that these regulations would result in a 2.8 percent reduction in GHG emissions from passenger vehicles compared to the 2020 business-as-usual scenario.

Heavy-Duty Vehicle Efficiency

This AB 32 Scoping Plan measure requires all existing trucks and trailers to be retrofitted with the best available technology and/or CARB-approved technology. Technologies that reduce GHG emissions and improve the fuel efficiency of trucks may include devices that reduce aerodynamic drag and rolling resistance. The requirements apply to California and out-of-state registered trucks that travel to California. This regulation is expected to result in a 2.9 percent reduction in GHG emissions from heavy and medium vehicles compared to the 2020 business-as-usual scenario.

Renewable Portfolio Standard

The State of California Renewable Portfolio Standard requires investor-owned utilities, electric service providers, and community choice aggregators to increase the portion of energy that comes from renewable sources to 20 percent by 2010 and 33 percent by 2020. In 2005, SDG&E's renewable portfolio was 5.5 percent; therefore, this regulation is expected to result in a 27.5 percent reduction in GHG emissions from residential, commercial, and industrial electricity consumption compared to the 2020 business-as-usual scenario.

Table 2-5: Summary of State Reductions and 2020 Adjusted Business-As-Usual GHG Emissions Forecast

State Measure	2020 Reduction (MT CO_2e)*
Clean Car Standards, AB 1493 (Pavley)	52,328
Low-Carbon Fuel Standard	25,262
Passenger Vehicle Efficiency	10,078
Heavy-Duty Vehicle Efficiency	8,421
Renewable Portfolio Standard	37,698
Total State Reduction	**133,787**
2020 Adjusted Business-As-Usual Forecast	**492,170**

*Refer to Appendix B for calculation details

2.4 GHG Emissions Reduction Target

The City is committed to reducing its share of GHG emissions consistent with AB 32. The AB 32 Scoping Plan encourages local governments to establish a reduction target that "parallels the State's commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels by 2020." Therefore, this CAP establishes a reduction target of 15 percent below 2005 levels by 2020 in conformance with the State's recommended reduction target. The 2005 baseline GHG emissions inventory and 2020 GHG emissions forecast under the adjusted business-as-usual scenario provide the necessary background for the City to identify the reduction in emissions needed from local measures to meet this target.

As shown in **Table 2-6**, based on the 15 percent reduction target, Vista would need to reduce its community emissions to 464,983 MT CO_2e by 2020. To meet this target, Vista will need to reduce its GHG emissions 5.5 percent below the adjusted business-as-usual forecast levels (equivalent to 27,187 MT CO_2e) by 2020 through implementation of local measures and actions.[ii]

Table 2-6: Vista's GHG Emissions, Target, and Reduction Necessary to Meet Target

	GHG Emissions (MT CO_2e)
2005 Baseline Emissions	547,039
2020 Adjusted Business-as-Usual Forecast	492,170
Target (15% below 2005 levels by 2020)	464,983
Total Reduction from 2020 Adjusted Business-as-Usual Forecast Necessary to Meet Target	**27,187**

[ii] As described in Section 2.3, the Adjusted 2020 Business-As-Usual forecast accounts for State-level measures that will reduce local GHG emissions. Therefore, it is used to determine the necessary reductions to meet the City's reduction target as it provides a more accurate picture of future emissions growth and the proportionate share of emissions the City must reduce once State measures to reduce GHG emissions have been implemented.

ENDNOTES

[1] Local Governments for Sustainability (ICLEI). (2009). *City of Vista Greenhouse Gas Emissions Inventory*. As updated by Rincon Consultants, Inc. and Fehr & Peers. (2011).

[2] ICLEI. (2009). *International Local Government GHG Emissions Analysis Protocol.* http://www.iclei.org/fileadmin/user_upload/documents/Global/Progams/CCP/Standards/IEAP_October2010_color.pdf

[3] California Air Resources Board (CARB). 2010. *Local Government Operations Protocol* (version 1.1). http://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf

[4] Refer to Section Two: *Methodology*; Appendix A: *Local Government Operations Protocol*; and Appendix E: *Community Inventory Methodology*, of the *City of Vista Greenhouse Gas Emissions Inventory*, located in Appendix A of this document, for a detailed description of the methodologies, as well as their limitations.

CHAPTER 3

CLIMATE ACTION MEASURES

3.0 Climate Action Measures

This chapter identifies the measures that the City will implement to achieve the State-recommended GHG emissions reduction target of 15 percent below 2005 levels by 2020, and prepare for the anticipated effects of climate change. The City has identified a set of action measures based on careful consideration of the reductions needed to achieve the target, the sources and distribution of emissions revealed in the GHG emissions inventory, existing priorities and resources, the potential costs and benefits of each measure, goals and policies identified in General Plan 2030, and strategies of neighboring jurisdictions and regional agencies. Detailed analyses of each measure's GHG reduction potential, estimated costs and savings, and relationship to General Plan 2030 goals and policies are located in Appendices B, C, and D.

3.1 Chapter Organization

The climate action measures are organized into six focus areas that represent the primary ways in which Vista will reduce GHG emissions and adapt to the anticipated effects of a changing climate. These focus areas include:

- Municipal Operations
- Energy
- Transportation and Land Use
- Solid Waste
- Community Education and Outreach
- Adaptation

Each focus area begins with an introduction, followed by a summary table listing the measures within the focus area and the associated GHG reduction potential. Following the introduction to each focus area, the chapter presents each measure with the following information:

- **Measure Description:** Measures represent the ways to reduce GHG emissions or adapt to a changing climate. The description provides important background information about the City's intent and policy direction.
- **Existing or Completed Efforts:** A list of efforts the City has implemented or is in the process of implementing since the baseline year (2005) to accomplish the measure.
- **Implementation Actions:** A list of actions to achieve the GHG emission reduction and outcome of the measure.
- **Potential Implementation Resources and Partners:** A list of government agencies, organizations, community groups, and educational organizations that could aid in the implementation of the measure either through technical assistance, financial assistance, or as a partner for implementation. Additional implementation direction is provided in Chapter 4, *Implementation and Monitoring*.

- **GHG Reduction Potential:** The GHG reduction potential value identifies the estimated annual emission reductions anticipated in 2020, measured in MT CO_2e per year. Supporting information pertaining to the reduction calculations is provided in Appendix B.
- **Costs and Savings:** For each measure, potential costs and savings to the City or community are categorized as low, medium, and high. **Table 3-1** summarizes these category definitions. Costs account for the expense that would occur beyond conducting business-as-usual (i.e., without implementation of the CAP). Supporting information is provided in Appendix C.

Table 3-1: Measure Cost and Savings

Cost/Savings Type	Range	
City Cost/Savings	Low: Medium: High:	$0 - $10,000 $10,001 - $100,000 $100,001 or greater
Private Cost/Savings	Low: Medium: High:	$0 - $10,000 $10,001 - $100,000 $100,001 or greater

Details to help the City implement each measure and monitor its progress are located in Chapter 4, *Implementation and Monitoring*. Details include responsible departments, implementation time frames, performance indicators to track progress, and potential funding resources.

3.2 Municipal Operations Measures

Increase the efficiency and sustainability of municipal facilities and operations.

The City has already begun to reduce its GHG emissions and is committed to building on those efforts by increasing energy efficiency and conservation in municipal buildings, increasing its use of renewable energy, reducing solid waste, and expanding commute options for City employees. This focus area identifies measures and actions the City can implement to further reduce GHG emissions from municipal operations and facilities. Although the GHG emissions that result from municipal operations and facilities account for less than one percent of Vista's community emissions, as an employer, property-owner, and regulatory entity, the City can set an example of GHG emissions reduction practices for the community and demonstrate additional benefits of the measures beyond reducing GHG emissions, such as cost savings in buildings and operations and improved operational efficiency. As shown in **Table 3-2**, the municipal operations measures have the potential to reduce Vista's GHG emissions by 489 MT CO_2e by 2020.

Table 3-2: Municipal Operations GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
M-1	CAP Implementation	NA
M-2	Energy Efficient Lighting	334
M-3	Renewable Energy	77
M-4	Employee Commute Alternatives	56
M-5	Municipal Recycling	22
Municipal Operations Total		**489**

M-1: CAP Implementation

GHG Reduction Potential:
NA
City Cost:
Medium
City Savings:
None
Private Cost:
None
Savings:
None

Establish a City CAP Coordinator and multi-departmental CAP Implementation Team to implement, monitor, and report on the status of measures and actions identified in the CAP.

Strong internal leadership and interdepartmental coordination provide a critical foundation for the CAP. As such, the City will establish a multi-departmental CAP Implementation Team to implement and monitor the CAP according to the implementation and monitoring plan set forth in Chapter 4. The City will also designate a staff member on the CAP Implementation Team as the CAP Coordinator. The CAP Coordinator will oversee the implementation, monitoring, and review of the CAP and facilitate coordination among the different City departments. To ensure effective implementation and monitoring, the City will provide CAP implementation and GHG reduction training to the CAP Implementation Team and other City staff.

The CAP Implementation Team will also serve to educate and raise staff and public awareness of CAP initiatives undertaken by various City departments. The CAP Implementation Team will utilize outlets, such as the City's website and newsletter, to ensure that the City's accomplishments and priorities are known to the community. The CAP Implementation Team will also act as a resource for outreach campaigns on other regional climate action efforts.

Existing and/or Completed Efforts in Support of Measure:

- None at this time.

Implementation Actions:

- **M-1.1:** Form a multi-departmental CAP Implementation Team that meets annually to implement, monitor, and report on the status of measures and actions identified in the CAP according to the implementation and monitoring chapter.
- **M-1.2:** Designate a City staff member on the CAP Implementation Team to have lead responsibilities for implementing the CAP and monitoring progress. Duties of this position include coordinating the CAP Implementation Team, preparing the annual CAP progress report to City Council, and coordinating the GHG emissions inventory and CAP updates as specified in the implementation and monitoring chapter.
- **M-1.3:** Provide CAP implementation and GHG reduction training to City staff.

Potential Implementation Resources and Partners:

- California Center for Sustainable Energy; San Diego Energy Resource Center; SANDAG; SDG&E; Institute for Local Government

M-2: Energy Efficient Lighting

Increase the efficiency of City-owned or -operated lighting.

GHG Reduction Potential:
334 MT CO_2e
City Cost:
Low
City Savings:
High
Private Cost:
None
Savings:
None

The City operates a range of public lighting, from street and traffic signal lights to outdoor and park lights. Replacing older, inefficient, mercury vapor lamps and incandescent bulbs with efficient lights, such as induction or light-emitting diode (LED) lamps, will not only reduce GHG emissions, but also reduce municipal electricity use and associated costs, reduce maintenance costs, and increase public safety. Compared to traditional fixtures, LED lights typically reduce energy use by 50 percent, last up to five times longer, and provide better light quality.[1] Under this measure, the City will continue to identify and secure funding to retrofit inefficient streetlights and traffic signals, as well as other outdoor lighting identified in the *City of Vista Energy Roadmap* (2012),[2] which will reduce electricity consumption and associated GHG emissions.

Existing and/or Completed Efforts in Support of Measure:

- In 2011, the City replaced 910 street lights and traffic signal lights and 300 amber traffic signal lamps with LED lights, resulting in approximately $50,000 annual savings in electricity costs and $20,000 annual on-going maintenance savings.
- In 2007, the City completed energy efficient lighting retrofits, installing T8-High Bay Fluorescents for the Fire Stations, Vehicle Maintenance/Gymnasium.
- In 2006, the City installed occupancy sensors at City Hall (old and new building) and Brengle Terrace Recreation Center.

Implementation Actions:

- **M-2.1:** Identify and secure additional funding to replace incandescent and mercury vapor street and traffic signal lights with LED, or other energy efficient lamps.
- **M-2.2:** Identify and secure funding to replace inefficient outdoor lights at City buildings and facilities as identified in the Vista Energy Roadmap.

Potential Implementation Resources and Partners:

- U.S. Department of Energy; California Energy Commission; California Infrastructure and Economic Development Bank; California Department of Housing and Community Development; SANDAG; SDG&E; California Lighting Technology Center

M-3: Renewable Energy

Continue to install renewable energy systems on City property.

GHG Reduction Potential:
77 MT CO_2e
City Cost:
Low
City Savings:
Medium
Private Cost:
None
Savings:
None

Renewable energy systems rely upon natural energy sources, including the sun, wind, moving water, and geothermal heat to produce electricity. By substituting renewable energy for fossil fuels, energy can be produced without generating GHG emissions. Although most forms of renewable energy currently cost more than fossil fuels, systems such as solar photovoltaics are becoming more cost-competitive and are eligible for various types of subsidies. Renewable energy installations can also reduce the risk of brownouts and help avoid the need for expensive additions to electricity generation and transmission capacity.

Existing and/or Completed Efforts in Support of Measure:

- In 2012, the City installed a 46 kWh solar photovoltaic system at the Vista Senior Center.
- In 2012, the City installed solar absorbing thermal water heating panels at the Wave Waterpark.

Implementation Actions:

- **M-3.1:** Identify cost-effective renewable energy opportunities for additional City properties and apply for federal, state, and utility grants and other funding opportunities when they become available.

Potential Implementation Resources and Partners:

- U.S. Department of Energy; California Energy Commission; California Public Utilities Commission; SDG&E; California Center for Sustainable Energy; San Diego Energy Resource Center; San Diego Renewable Energy Society; Institute for Local Government; CleanTECH San Diego

M-4: Employee Commute Alternatives

Provide information and incentives to City employees to increase carpooling, public transit use, bicycling, and walking in order to reduce vehicle miles traveled associated with employee commute.

GHG Reduction Potential:
56 MT CO_2e
City Cost:
Low
City Savings:
Low
Private Cost:
None
Savings:
None

Employee commutes account for 29 percent of municipal emissions.[3] The City can help reduce these emissions by identifying and promoting commuter programs to its employees. Such programs provide alternative transportation options to driving alone and incentives to use them. SANDAG has played a lead role in local commute alternative programs with its iCommute program. iCommute provides free assistance to local businesses and organizations, such as the City, to help them develop and implement customized employee commuter benefit programs that lower costs, increase productivity, and help the environment.

A custom program could include everything from helping connect employees who want to carpool or vanpool with one another, to offering flexible work schedules and telework options, to providing free or reduced-cost transit passes. SANDAG offers a number of free programs, such as the Guaranteed Ride Home Program, while others are inexpensive or come with subsidies, such as subsidies for qualifying vanpools. Other measures, such as preferential parking for carpool/vanpool vehicles and secure bicycle parking at City facilities, support bicycling and carpooling to work.

In addition, the City can promote and participate in annual events within the San Diego region, such as *Bike to Work Day*, *Dump the Pump*, and *Rideshare Week,* to encourage employees to select alternative transportation options to driving alone. A reduction in single-occupancy employee vehicle commute trips will not only reduce GHG emissions, but can also reduce employee commute costs, save employees time, and improve employee health.

Existing and/or Completed Efforts in Support of Measure:

- In 2010, the City installed secure bicycle parking at the Vista Civic Center.

Implementation Actions:

- **M-4.1:** Provide information on SANDAG's free iCommute program to develop and implement a commuter benefit program, such as discounted transit passes.
- **M-4-2:** Promote and participate in annual regional commute trip reduction events.

Potential Implementation Resources and Partners:

- SANDAG; North County Transit District (NCTD); Victoria Transport Policy Institute

M-5: Municipal Recycling

GHG Reduction Potential:

22 MT CO_2e

City Cost:

Low

City Savings:

None

Private Cost:

None

Savings:

None

Increase the amount of municipal solid waste recycled by 10 percent.

Solid waste accounts for three percent of municipal emissions.[4] By providing recycling receptacles at key locations and encouraging their use, the City can reduce emissions related to solid waste. Increasing the recovery of recyclable materials will reduce the amount of solid waste that is delivered to landfills serving the City and the resulting GHG emissions. Recycling also reduces demand for limited natural resources used to manufacture products.

Existing and/or Completed Efforts in Support of Measure:

- In 2010, the City purchased approximately 200 recycling containers for the Vista Civic Center.
- In 2012, the City's contract waste hauler, Escondido Disposal (EDCO), began accepting Polystyrene (Styrofoam™) in residential curbside and commercial recycling programs in an effort to expand recycling efforts. Polystyrene is commonly used in packing material, food containers and in a wide variety of other products.

Implementation Actions:

- **M-5.1:** Identify City-owned or -operated facilities that need recycling receptacles, such as parks and recreational facilities. Install receptacles at appropriate locations and post signs to encourage recycling at these locations.

Potential Implementation Resources and Partners:

- California Department of Resources Recycling and Recovery (CalRecycle); Institute for Local Government; EDCO

3.3 Energy Measures

Increase energy efficiency, conservation, and the use of renewable energy sources in Vista.

Energy use accounts for 36 percent of Vista's total GHG emissions, resulting in 198,283 MT CO_2e annually.[5] These emissions result from the combustion of fossil fuel, primarily coal, oil, and natural gas, which is used to heat, cool, and provide power to residential, commercial, and industrial buildings and other facilities. Factors affecting energy-related emissions in buildings include building design and the efficiency of technology and electronics in buildings. GHG emissions reductions can be achieved both by changes to the energy demand (e.g., improving energy efficiency and reducing consumption) and energy supply (e.g., switching from a high-carbon to a low- or zero-carbon technology or fuel). The energy measures listed in **Table 3-3** focus on these strategies and have the potential to reduce Vista's GHG emissions by 15,922 MT CO_2e by 2020.

In addition to reducing GHG emissions, the energy measures described in this section have the potential to provide other important benefits to the community. These benefits include:

- Reduced energy/operating costs
- Lower maintenance costs and extended equipment lives
- Increased building re-sale value
- Local economy support
- Energy conservation
- Increased electricity reliability
- City beautification
- Improved air quality

Table 3-3: Energy GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
E-1	Energy Efficiency Building Standards	3,994
E-2	Energy Efficiency in Existing Buildings	4,461
E-3	Smart Meters	3,629
E-4	Small-Scale Renewable Energy	3,712
E-5	Tree Planting and Urban Forests	126
Energy Total		**15,922**

Measure E-1: Energy Efficiency Building Standards

GHG Reduction Potential:

3,994 MT CO_2e

City Cost:

None

City Savings:

None

Private Cost:

None

Savings:

None

Ensure that new development complies with the energy efficiency and green building standards identified in Title 24 of the California Code of Regulations.

Title 24 of the California Code of Regulations mandates how each new home and business is built in California. It includes requirements for the structural, plumbing, electrical, and mechanical systems of buildings and for energy conservation, green design, and accessibility in and about buildings. This measure focuses on two sections of Title 24— Part 6, the California Energy Code, and Part 11, the California Green Building Standards Code (the CALGreen Code). These two sections require direct electricity, natural gas, and water savings for every new residential and non-residential building built in California.

California's building codes are published on a triennial basis. The most recent update to the California Energy Code was the 2008 Title 24 Building Energy Efficiency Standards, which went into effect on January 1, 2010, for both residential and nonresidential new construction. It also includes requirements for lighting and insulation upgrades to nonresidential buildings undergoing a major retrofit. The 2013 Title 24 Building Energy Efficiency Standards will go into effect on January 1, 2014. The CALGreen Code (effective January 1, 2011) was the first statewide green building code developed to provide a consistent approach for green building within California. It identifies minimum requirements for newly constructed buildings in California, which will reduce GHG emissions through improved efficiency.

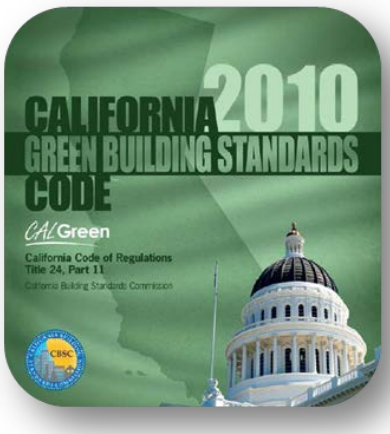
Title 24 is a statewide standard applied at the local level by local agencies through project review. As the City has already adopted the California Energy Code and the CALGreen Code by reference into the City's Development Code, it will continue to enforce these mandates, which will reduce energy consumption and associated GHG emissions.

Existing and/or Completed Efforts in Support of Measure:

- In October 2010, the City adopted by reference the CALGreen Code into the City's Development Code, Chapter 16.30.

Implementation Actions:

- **E-1.1:** Continue to enforce the California Energy Code and CALGreen Code through the development review process.
- **E-1.2:** Continue to provide information and forms on the City's website to facilitate project compliance with the California Energy Code and CALGreen Code.



Potential Implementation Resources and Partners:

- California Building Standards Commission; California Energy Commission; California Association of Local Building Officials; SDG&E; San Diego Energy Resource Center; California Center for Sustainable Energy

Measure E-2: Energy Efficiency in Existing Buildings

GHG Reduction Potential:
4,461 MT CO_2e
City Cost:
Low
City Savings:
None
Private Cost:
Low to High
Savings:
Low to High

Facilitate voluntary energy efficiency improvements and upgrades in existing residential, commercial, and industrial buildings within Vista.

Increasing the energy efficiency of buildings is one of the most-cost effective approaches for reducing GHG emissions. It is especially important as approximately 49 percent of housing units in Vista were constructed prior to Title 24 of the California Code of Regulations.[6] Many improvements can be applied to existing buildings through no- to low-cost investments to improve their energy efficiency, including using efficient light bulbs and fixtures, replacing appliances with more efficient ones, increasing insulation, replacing windows, and upgrading HVAC systems.

Under this measure, the City will encourage efficiency improvements by partnering with organizations, such as SDG&E, SANDAG, and San Diego Energy Resource Center to provide and promote energy efficiency and conservation programs. The City will also leverage Energy Upgrade California's educational materials and online platforms to connect community members to incentives, technical assistance, and qualified contractors. In addition, the City will also promote resources to link home and building owners to educational and financial resources, such as California Flex Your Power, and utility programs, such as free energy audits and energy efficiency rebates.

Existing and/or Completed Efforts in Support of Measure:

- In 2010, the City adopted cool roof requirements for non-residential re-roof projects.

Implementation Actions:

- **E-2.1:** Partner with SDG&E to provide and promote energy efficiency and conservation education, training, rebates, and incentives to Vista residents, businesses, and employees.
- **E-2.2:** Provide information on the City's website related to steps that residents and businesses can take to conserve energy and increase efficiency, including links to energy efficiency and conservation programs and websites, such as Energy Upgrade California and Flex Your Power.
- **E-2.3:** Participate in and promote an energy efficiency financing program (through CaliforniaFIRST, Energy Upgrade California, a Property Assessed Clean Energy [PACE] program, a joint powers authority with neighboring jurisdictions, or other mechanisms) allowing residential and commercial property owners to voluntarily invest in energy efficiency upgrades for their buildings.

Potential Implementation Resources and Partners:

- U.S. Department of Energy; California Energy Commission; SDG&E; San Diego Energy Resource Center; California Center for Sustainable Energy; Institute for Local Government; CleanTECH San Diego; U.S. Green Building Council; Build It Green™

Measure E-3: Smart Meters

GHG Reduction Potential:
3,629 MT CO_2e
City Cost:
Low
City Savings:
None
Private Cost:
None
Savings:
Low

Increase the community's awareness, understanding and use of real-time energy consumption data and pricing available through SDG&E's Smart Meter program.

Smart meters and advanced metering infrastructure can help to reduce regional energy peak demand by providing customers with detailed information about their energy consumption and charging dynamic rates for electricity. Pilot smart metering projects in the San Diego region and across the state have shown that consumers provided with information about their energy use and the actual cost of electricity based on the time of use, modified their consumption and reduced peak demand, thereby reducing associated GHG emissions.

In addition, smart meters can communicate to smart end-use devices and appliances. This will enable energy consumers to cycle air-conditioning units off and on, set clothes dryers and dishwashers to run at off-peak hours, and manage other energy intensive equipment based on the time of use, and the cost and availability of electricity. In addition, the data collected by Smart Meters provide the opportunity to empower households to become better energy managers and reduce consumption through continuous feedback of real-time energy use.

Existing and/or Completed Efforts in Support of Measure:

- None at this time.

Implementation Actions:

- **E-3.1:** Assist SDG&E in its efforts to educate residents and business owners about Smart Meters, how to monitor electricity use, and the potential benefits associated with Smart Meters.
- **E-3.2:** Inform the community of metering options, such as online applications and in-home monitors.
- **E-3.3:** Connect residents and businesses with rebate and incentive programs that give priority to appliances with smart grid technology through the City's website.

Potential Implementation Resources and Partners:

- California Public Utilities Commission; California Energy Commission; SDG&E; San Diego Energy Resource Center; California Center for Sustainable Energy; CleanTECH San Diego

Measure E-4: Small-Scale Renewable Energy Installations

GHG Reduction Potential:
3,712 MT CO_2e
City Cost:
Low
City Savings:
None
Private Cost:
Medium to High
Savings:
Low to High

Facilitate the installation and use of small-scale renewable energy systems, such as solar photovoltaic panels, on new and existing buildings.

Renewable energy systems reduce reliance upon fossil fuels and thereby reduce GHG emissions. Renewable energy systems generally include solar photovoltaic, wind, biomass, and geothermal. The most prominent, cost effective and applicable renewable energy source for the City would be solar energy. However, other renewable energy sources are increasingly becoming more cost effective, including wind conversion systems.

The City will support the installation of small-scale renewable energy systems by continuing to participate in SDG&E's Assistance Programs through the California Public Utilities Commission's California Solar Initiative, which provides incentives for solar installations on existing residential homes and existing and new commercial and industrial development, and the New Solar Homes Partnership, which encourages the construction of new energy efficient solar homes. The City will also connect property owners to websites that offer technical and financial incentives and develop policy incentives to encourage the installation of renewable energy systems.

Existing and/or Completed Efforts in Support of Measure:

- The City participates in SDG&E assistance programs to help property owners' finance and install renewable energy systems.

Implementation Actions:

- **E-4.1:** Continue to participate in a renewable energy financing program to allow property owners in Vista to finance the installation of on-site solar photovoltaic and hot water systems.
- **E-4.2:** Provide links to programs and websites that offer technical and financial assistance and incentives through the City's website.
- **E-4.3:** Develop and adopt a policy or program that offers incentives, such as expedited permit processing or reduced fees, to encourage the installation of renewable energy systems on new or existing buildings.

Potential Implementation Resources and Partners:

- U.S. Department of Energy; California Energy Commission; California Public Utilities Commission; SDG&E; California Center for Sustainable Energy; San Diego Energy Resource Center; Institute for Local Government; San Diego Renewable Energy Society; CleanTECH San Diego

Measure E-5: Tree Planting and Urban Forests

Preserve and increase the amount of urban forest within the City.

GHG Reduction Potential:
126 MT CO_2e
City Cost:
Low
City Savings:
Medium
Private Cost:
None
Savings:
Low

Trees and plants remove carbon dioxide from the atmosphere in a process called carbon sequestration. By maintaining a healthy urban forest, prolonging the life of trees, and continually increasing the number of trees, communities can increase their net carbon storage over the long term. Trees and other vegetation also reduce local surface temperatures (exacerbated by the heat island effect) and air temperatures, which reduces cooling-related energy use.

Approximately 616 acres (or six percent) of the land area in Vista is designated Open Space on the Land Use Map.[7] Retaining open space in its natural state and preserving trees provides many benefits to the community, in addition to reducing GHG emissions, such as absorbing air pollutants from the air, reducing storm water runoff, creating a more attractive environment, and increase property values. Studies have found that access to trees and natural environments can improve mental and physical health, improve job productivity, and reduce crime.[8]

Existing and/or Completed Efforts in Support of Measure:

- In 2010, the City planted over 125 trees (e.g., California Sycamore) to shade the Civic Center, including the parking lots, and 150 trees in Brengle Terrace Park. In 2011, volunteers planted 60 additional trees in Brengle Terrace Park.
- The City is participating in the San Diego County Tree Map Project to map every tree in Vista.

Implementation Actions:

- **E-5.1:** Update the Street Tree, Shrubs and Plants Ordinance to ensure the effectiveness of preserving and sustaining the city's urban forest.
- **E-5.2:** Identify and secure grant funding to prepare an updated Urban Forest Management Plan.

Potential Implementation Resources and Partners:

- U.S. Forest Service; California Department of Forestry and Fire Protection (CAL FIRE); California Strategic Growth Center; California Center for Sustainable Energy; San Diego Regional Urban Forests Council; Urban Corps of San Diego County; West Coast Arborists; Urban Forest Ecosystems Institute

3.4 Transportation and Land Use Measures

Decrease vehicle miles traveled.

Transportation-related emissions make up the largest portion (57 percent) of Vista's GHG emissions inventory, resulting in 314,097 MT CO_2e annually.[9] The majority of these emissions (91 percent) result from the use of fuel to power vehicles in Vista. The remaining nine percent of the community's emissions result from off-road vehicle use. Factors affecting GHG emission from transportation include the number of vehicle miles traveled (VMT), fuel economy, and the type of fuel used. The number of VMT is directly influenced by the geographic distribution of people and places, especially the density of development and zoning. Therefore, land use measures are included as reduction policies in this section.

The measures in this section focus on reducing GHG emissions from transportation fuel consumption by reducing VMT. This involves reducing automobile dependence by facilitating smart growth development patterns, promoting walking, bicycling, and public transit as viable travel options, and managing transportation demand. The transportation and land use measures listed in **Table 3-4** focus on these strategies and have the potential to reduce Vista's GHG emissions by 11,039 MT CO_2e by 2020.

The transportation and land use measures in this section will not only help reduce GHG emissions, but also provide multiple benefits to the community. These include:

- Reduced transportation expenses
- Improved air quality
- Reduced noise and water pollution
- Help relieve traffic congestion
- Improved public health
- More efficient utilization of existing infrastructure
- Increased community interaction
- Improved access to a variety of mobility options
- More diverse housing options focused on proximity to jobs, recreation, and services

Table 3-4: Transportation and Land Use GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
T-1	Bicycle and Pedestrian Travel	1,745
T-2	Transit Travel	1,912
T-3	Commute Trip Reduction	2,420
T-4	Smart Growth	4,962
Transportation Total		**11,039**

Measure T-1: Bicycle and Pedestrian Travel

Continue to expand and improve the City's bicycle and pedestrian network.

GHG Reduction Potential:
1,745 MT CO_2e
City Cost:
Low
City Savings:
None
Private Cost:
None
Savings:
Low to High

A transportation network that accommodates pedestrian and cyclist needs rather than automobiles alone can increase walking and cycling, particularly when emphasis is placed on connectivity and safety. Creating a safe, attractive, accessible, and convenient bicycle and pedestrian network provides alternatives to the personal automobile and encourages use of these facilities. When members of the community choose to walk or bike, rather than drive personal automobiles, the number of cars on the road decreases, which reduces GHG emissions and other air pollutants.

Existing and/or Completed Efforts in Support of Measure:

- The City is in the process of completing a number of pedestrian and bicycle facility improvements, including the Inland Rail Trail and improvements along Grapevine Road, West California Avenue, Maryland Drive, and Olivera Avenue.
- In 2010, the City adopted by reference the CALGreen Code which includes bicycle parking requirements for non-residential development.

Implementation Actions:

- **T-1.1:** Continue to pursue public and private funding to expand and link the City's bicycle and pedestrian network in accordance with the General Plan 2030 Circulation Element.
- **T-1.2:** Incorporate multi-modal improvements into pavement resurfacing, restriping, and signalization operations where the safety and convenience of users can be improved within the scope of work.
- **T-1.3:** Establish minimum design criteria for pedestrian circulation and implement through the design review process.
- **T-1.4:** Through the development review process: (a) ensure that the street right-of-way is designed to accommodate and connect appropriate modes of transportation; (b) continue to enforce mandatory CALGreen Code bicycle parking standards; (c) require proposed development to provide facilities for pedestrian travel, such as sidewalks, and provide pedestrian access to the development via sidewalks; (d) require proposed development to provide bike facilities within the right-of-way for Class II bikeways in the project vicinity on all arterial roadways where deemed appropriate. Where Class II bikeways are not feasible, require Class III bike routes to be provided as a temporary measure. Implement through conditions of approval.

Potential Implementation Resources and Partners:

- California Department of Transportation (Caltrans); SANDAG; San Diego County Bicycle Coalition; WalkSanDiego; California Bicycle Coalition

Measure T-2: Transit Travel

GHG Reduction Potential:
1,912 MT CO_2e
City Cost:
Low
City Savings:
None
Private Cost:
None
Savings:
Low to High

Continue to expand and improve the transit network and its accessibility within Vista.

The availability of reliable, convenient, and affordable public transportation, such as buses and light rail, can encourage individuals to take public transit over private vehicles. The result is fewer VMT and reduced emissions. The City has an extensive, multi-modal network of public transit routes operated from the Vista Transit Center. From the Transit Center, NCTD provides bus (BREEZE) and light rail (SPRINTER) services throughout the city, offering local and regional connections between Vista and adjacent cities as well as connections to other transit providers, including the COASTER, Amtrak, Metrolink, the County Transit System, and San Diego Transit and Trolley. Continued expansion and improvement of these transit options can reduce greenhouse gas emissions and air pollution, while at reducing congestion. Further, Safe Routes to Transit improvements that ensure safe pedestrian and bicycle access to transit stations within Vista, can help to increase transit as a viable travel option and remove barriers that may exist.

Existing and/or Completed Efforts in Support of Measure:

- In 2008, NCTD began operation of the light rail SPRINTER service. The SPRINTER has 15 stations throughout the region, including two in Vista (Vista Transit Center and Civic Center Drive (formerly Escondido Avenue). The Vista Transit Center connects the SPRINTER to numerous BREEZE lines and is a central transit hub in North San Diego County. All stations have free parking lots.

Implementation Actions:

- **T-2.1:** Coordinate with NCTD to continue to expand local rail and bus service to and within Vista.
- **T-2.2:** Support the efforts of SANDAG and NCTD to double-track the SPRINTER line and allow for grade separation projects at major intersections in the City.
- **T-2.3:** Coordinate with NCTD to maintain and upgrade transit stops to provide safe, attractive, and clearly identifiable stops throughout the community.
- **T-2.4:** Coordinate with SANDAG to maintain the current Park and Ride facility and add more facilities if the demand warrants.
- **T-2.5:** Through the development review process, require the construction of bus turnouts with shelters adjacent to new projects where transit demand warrants such improvements. Implement through conditions of approval.
- **T-2.6:** Coordinate with SANDAG to identify and implement Safe Routes to Transit projects within Vista to increase transit as a viable travel option.

Potential Implementation Resources and Partners:

- SANDAG; NCTD; Caltrans; California Infrastructure and Economic Development Bank

Measure T-3: Commute Trip Reduction

Promote SANDAG's regional commute trip reduction program that gives commuters and employers resources and incentives to reduce their single-occupancy automobile trips.

GHG Reduction Potential:
2,420 MT CO_2e
City Cost:
Low
City Savings:
None
Private Cost:
None
Savings:
Low to High

Commute trip reduction programs provide alternative transportation options to driving alone and incentives to use them. Alternative transportation options include car-pooling, cycling, taking public transit, walking where possible, or telecommuting instead of driving alone to work. SANDAG has played a lead role in regional commute alternative programs through its iCommute program. iCommute provides free assistance to local businesses and organizations helping them develop and implement customized employee commuter benefit programs that lower costs, increase productivity, and help the environment. iCommute also assists commuters by providing free carpool and ridematching services, a subsidized vanpool program, transit solutions, regional support for bicycling, the Guaranteed Ride Home program, SchoolPool carpooling programs for parents, and information about teleworking. This measure calls for the City to promote commute trip reduction programs, such as iCommute, with an emphasis on employer services.

Existing and/or Completed Efforts in Support of Measure:

- None at this time.

Regional commuter options for Vista include: *carpools, vanpools, SPRINTER, bus, biking, walking, and teleworking.*

Implementation Actions:

- **T-3.1:** Provide information on, and links to commuter assistance programs and employer services offered through SANDAG's iCommute program on the City's website.
- **T-3.2:** Work with the Chamber of Commerce, Vista Village Business Association, and other business support groups, to promote commute trip reduction programs, such as iCommute, with an emphasis on employer services.

Potential Implementation Resources and Partners:

- Caltrans; SANDAG; NCTD; San Diego Regional Clean Fuels Coalition

Measure T-4: Smart Growth

GHG Reduction Potential:
4,962 MT CO_2e
City Cost:
Low
City Savings:
None
Private Cost:
None
Savings:
Low to High

Promote sustainable and smart growth land use patterns and development regulations and guidelines.

Smart growth can be defined as a compact, efficient, and environmentally sensitive pattern of development that provides people with additional travel, housing, and employment choices by focusing future growth away from rural areas and closer to existing and planned job centers and public facilities, while preserving open space and natural resources. This pattern of development reduces VMT and associated GHG emissions.

The General Plan 2030 Land Use and Community Identity Element provides the City an opportunity to apply smart growth principles through new development, redevelopment, and infill, emphasizing pedestrian- and transit-friendly design, transit-supportive residential densities, and mixed-use development. The City will encourage this change through incentives, use of design guidelines, and making improvements to the infrastructure to create a transit- and pedestrian-supportive environment, particularly in seven existing or potential SANDAG Smart Growth Areas within Vista's city limit. The City will also work with SANDAG to incorporate an additional proposed Smart Growth Area on SANDAG's Concept Map, identified in General Plan 2030.

Existing and/or Completed Efforts in Support of Measure:

- In coordination with the City, SANDAG prepared a Smart Growth Map, which identified seven key areas within the City that would be well suited for smart growth principles. General Plan 2030 includes policies to facilitate smart growth in these areas, as well as one additional area.
- General Plan 2030 includes a Mixed Use (MU) land use designation. The purpose of this designation is to implement the principals of smart growth by applying the designation to certain areas along the City's main transportation corridors that could successfully support a combination of uses (multi-family residential, retail, and office uses) within a single development plan.
- In 2011, the City submitted applications to receive funding under SANDAG's *TransNet* Smart Growth Incentive Program, which funds transportation and transportation-related infrastructure improvements and planning efforts that support smart growth development.

Implementation Actions:

- **T-4.1:** Revise the City's zoning designations, development standards, and design guidelines to be consistent with the General Plan 2030 Land Use and Community Identity Element.
- **T-4.2:** Develop and offer incentives for mixed-use, transit-oriented, and affordable housing projects in designated SANDAG Smart Growth Areas (and/or General Plan 2030 Opportunity Areas), including reduced parking requirements and expedited permit processing.

- **T-4.3:** Work with SANDAG to achieve regional smart growth goals through implementation of the Regional Comprehensive Plan and Smart Growth Concept Map, as identified in the Opportunity Areas and supporting goals and policies throughout General Plan 2030.
- **T-4.4:** Encourage SANDAG to update the Smart Growth Map to incorporate changes consistent with General Plan 2030.
- **T-4.5:** Through the development review process, evaluate mixed-use development projects based on consistency with the City's adopted General Plan 2030, updated zoning regulations, and adopted Design Guidelines, as well as SANDAG Smart Growth publications including: (a) Designing for Smart Growth, Creating Great Places in the San Diego Region; (b) Planning and Designing for Pedestrians, Model Guidelines for the San Diego Region; (c) Trip Generation for Smart Growth; and (d) Parking Strategies for Smart Growth.

Potential Implementation Resources and Partners:

- Federal Transportation Authority; Caltrans; California Strategic Growth Council; SANDAG; Institute for Local Government; Local Government Commission; Smart Growth Network; neighboring jurisdictions

3.5 Solid Waste Measures

Reduce the amount of solid waste generated and sent to landfills from Vista.

As solid waste decomposes in landfills, it releases methane, a GHG 21 times more potent than carbon dioxide.[10] In 2005, Vista generated approximately 233,693 tons of solid waste.[11] Approximately 41 percent of the solid waste was diverted from landfills through recycling programs. The remaining 137,469 tons of solid waste was transported to nearby landfills, resulting in 30,310 MT CO_2e.

Waste management is an important action that the community can take to reduce GHG emissions. Waste management can be achieved by reducing the amount of trash and other waste that is discarded; reusing containers, products, and building materials; and recycling as many materials as possible, including green waste and construction materials. The solid waste measures listed in **Table 3-5** focus on these strategies and have the potential to reduce Vista's GHG emissions by 4,583 MT CO_2e by 2020.

In addition to reducing GHG emissions, the solid waste measures described in this section have the potential to provide other important benefits to the community. These include:

- Cost savings
- Improved air quality

Table 3-5: Solid Waste GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
S-1	Expanded Recycling	2,711
S-2	Construction and Demolition Debris Diversion	1,872
Solid Waste Total		**4,583**

Measure S-1: Expanded Recycling

Create a mandatory solid waste recycling program for multi-family residences and commercial operations.

GHG Reduction Potential:

2,711 MT CO_2e

City Cost:

None

City Savings:

None

Private Cost:

None

Savings:

None

According to CalRecycle, the commercial sector generates nearly three fourths of the solid waste in California and much of the commercial sector waste disposed in landfills is readily recyclable.[12] As such, the State passed AB 341, California's Mandatory Commercial Recycling Law in January 2012, which becomes effective July 1, 2012. AB 341 sets forth recycling requirements for multi-family residences and commercial operations. Increasing the recovery of recyclable materials will directly reduce GHG emissions. In particular, recycled materials can reduce the GHG emissions from multiple phases of product production, including extraction of raw materials, preprocessing and manufacturing. Increased recycling also results in avoided methane emissions at landfills from the decomposition of organic materials.

Existing and/or Completed Efforts in Support of Measure:

- Under AB 341, starting July 1, 2012, businesses that generate four cubic yards or more of commercial solid waste per week or a multi-family residential dwelling of five units or more will be required to recycle.

Implementation Actions:

- **S-1.1:** Coordinate with EDCO to implement a multi-family residential and commercial solid waste recycling program that consists of education, outreach, and monitoring.

Potential Implementation Resources and Partners:

- CalRecycle; EDCO; Institute for Local Government

Measure S-2: Construction and Demolition Debris Diversion

GHG Reduction Potential:

1,872 MT CO_2e

City Cost:

None

City Savings:

None

Private Cost:

None

Savings:

None

Require the redirection of at least 50 percent of the total construction and demolition debris generated by a project via reuse or recycling.

Construction and demolition waste can be a significant portion of a community's waste stream and diverting it from landfills will result in reduction of landfill gas emissions, thereby reducing overall GHGs emitted into the atmosphere. Construction and demolition waste generally includes anything discarded from a project site, such as wood scraps, cardboard, flashing, paint or other finishing products, tools, drywall, concrete, asphalt, plastic bags, remnants of insulation, etc.

Existing and/or Completed Efforts in Support of Measure:

- In 2006 (and updated in 2011), the City developed and incorporated construction and demolition debris diversion requirements into Chapter 13.17 of the Municipal Code. This chapter requires the diversion of at least 50 percent of the total construction and demolition debris generated by a project from landfills via reuse or recycling. This requirement applies to all construction, renovation, and remodel projects within the city, including City sponsored projects, with a total project value equal to or greater than $75,000, and all demolition projects.

Implementation Actions:

- **S-2.1:** Continue to implement through the development review process.

Potential Implementation Resources and Partners:

- CalRecycle; EDCO

3.6 Community Education and Outreach Measures

Increase public awareness of the City's GHG reduction efforts and actions community members can take to reduce GHG emissions.

Community involvement, public education, and outreach are critical to promote individual measures that help reduce GHG emissions and maximize their effect. The City can encourage community members to take the steps necessary to reduce their contribution of GHG emissions by providing information about climate change science and anticipated impacts, and by connecting residents and businesses with information, tools, and resources to help them take action. Effective public participation will increase the likelihood that the climate action measures identified in this plan achieve their GHG reduction potential.

In addition to reducing GHG emissions, the community education and outreach measures described in this section have the potential to provide other important benefits to the community. These include:

- Municipal leadership
- Increased community interaction
- Support all other GHG reduction measures

Table 3-6: Community Education and Outreach GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reductions (MT CO_2e)
C-1	Community Education and Outreach	Supporting
Community Education and Outreach Total		**Supporting**

Measure C-1: Community Education and Outreach

Develop a public outreach program to increase public awareness of potential climate change impacts, the City's GHG reduction efforts, and actions community members can take to reduce their GHG emissions.

GHG Reduction Potential:
Supporting Measure
City Cost:
Low
City Savings:
None
Private Cost:
None
Savings:
None

Community involvement is essential to achieving Vista's GHG emissions reduction target. Measures will be more successful when the public clearly understands the desired outcomes, why they are important, and how to achieve the results. In order to educate the community on ways to reduce GHG emissions, the City will create and promote a climate action page on the City's website and update it regularly. The City will also educate the community through its newsletter. As an incentive for individuals, groups, and businesses to take action and reduce emissions, the City will recognize community members that have made changes to reduce their GHG emissions on the City's climate action page or in the City newsletter.

Existing and/or Completed Efforts in Support of Measure:

- None at this time.

Implementation Actions:

- **C-1.1:** Create a climate action page on the City's website and update every six months.
- **C-1.2:** Establish a section in the City newsletter that raises awareness of climate change and ways to reduce GHG emissions, with an emphasis on cost savings and benefits.
- **C-1.3:** Recognize individuals, groups, or businesses that have made changes to reduce their GHG emissions on the City's climate action page or in the City newsletter.

Potential Implementation Resources and Partners:

- SANDAG; SDG&E; Caltrans; San Diego Energy Resource Center; California Center for Sustainable Energy; Institute for Local Government; neighboring jurisdictions; community organizations

3.7 Adaptation Measures

Improve Vista's resiliency to anticipated climate change impacts through adaptation and preparation.

Two types of responses to climate change are available: mitigation and adaptation. The previous focus areas have primarily addressed mitigation, or reducing GHG emissions to help limit future climate change. This section addresses adaptation, or preparing for and managing risk associated with climate change effects.

Chapter 1.0, *Introduction*, describes the potential climate change effects that Vista could expect, based on current science and understanding, which include an increase in temperature and heat waves, a decrease in the consistent supply of fresh water, increased risk of wildfires, negative impacts on biodiversity, and an increased risk to public health. The adaptation measures provide a basic framework for integrating climate change risk assessment and management into current planning processes. Where appropriate, the strategies also highlight mitigation measures for GHG reduction in other sections of the CAP that also contribute to adaptation.

Measure A-1: Climate Change Vulnerability

Identify and periodically reassess regional climate change vulnerabilities.

GHG Reduction Potential:
NA
City Cost:
Low
City Savings:
None
Private Cost:
None
Savings:
None

As described in Chapter 1, potential climate change impacts within the San Diego region include heat waves, adverse air quality, wildfires, water supply shortages, infectious diseases, loss of biological resources, loss of agriculture, and more frequent power outages due to increased energy demand. The City will periodically assess these potential vulnerabilities on a regional basis to plan and mitigate potential impacts accordingly.

Existing and/or Completed Efforts in Support of Measure:

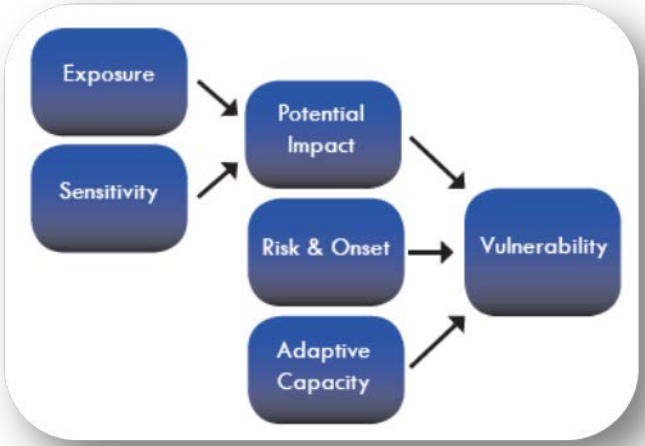
- None at this time.

Implementation Actions:

- **A-1.1:** Participate in inter-agency and/or inter-jurisdictional meetings and planning activities to identify and periodically reassess regional climate change vulnerabilities.
- **A-1.2:** Incorporate newly identified adaptation measures into planning documents as appropriate.

Potential Implementation Resources and Partners:

- California Office of Planning Research; California Natural Resources Agency; California Emergency Management Agency; California Climate Change Research Center; California Strategic Growth Council; The San Diego Foundation; Vista Irrigation District; Cal-Adapt



Steps in Vulnerability Assessment from the *California Adaptation Policy Guide* (2012)

Measure A-2: Public Health and Safety

Help protect the public from potential increases in hazards and health risks due to climate change.

GHG Reduction Potential:
NA
City Cost:
Low
City Savings:
None
Private Cost:
None
Savings:
None

Potential climate change impacts related to hazards and health risks within the San Diego region include heat waves, adverse air quality, wildfires, water supply shortages, and infectious diseases. The City will coordinate with regional agencies and community-based organizations to address these public health and safety risks and distribute public preparedness and emergency response information.

Existing and/or Completed Efforts in Support of Measure:

- None at this time.

Implementation Actions:

- **A-2.1:** Continue to coordinate with the San Diego County Office of Emergency Services to update the Multi-Jurisdictional Hazard Mitigation Plan to address the hazards and public health risks associated with climate change.
- **A-2.2:** Through the development review process, ensure that new development located in or near areas that may pose public health and safety hazards (such as flood plains and fire hazard zones) is designed to avoid and/or minimize potential impacts on people and property.
- **A-2.3:** Collaborate with community-based organizations (such as health care providers, public health advocates, fire prevention organizations, etc.) to disseminate public preparedness and emergency response information related to climate change. Provide information on the City's website.

Potential Implementation Resources and Partners:

- California Strategic Growth Council; California Emergency Management Agency; California Natural Resources Agency; CAL FIRE; California Fire Alliance; California FireSafe Council; Bureau of Land Management; Fish and Wildlife Service; San Diego County Office of Emergency Services; The San Diego Foundation

Measure A-3: Water Resources

Prepare for anticipated climate change effects on water resources.

Water resources are vital to Vista. There are a number of beneficial uses of water resources. Beneficial uses of water resources in the city's watersheds include: municipal and domestic supply, agricultural supply, industrial service supply, hydropower generation, contact water recreation, non-contact water recreation, preservation of biological habitats of special significance, warm freshwater habitat, cold freshwater habitat, wildlife habitat, and rare, threatened, or endangered species, commercial and sport fishing, and shellfish harvesting. Moreover, the City recognizes the interconnectedness of water quality including surface, storm, and wastewater management; water supply; and natural resources. It is therefore imperative that the City protect its water resources and prepare for potential climate change effects.

GHG Reduction Potential:

NA

City Cost:

Low

City Savings:

None

Private Cost:

None

Savings:

None

Existing and/or Completed Efforts in Support of Measure:

- None at this time.

Implementation Actions:

- **A-3.1:** Continue to coordinate with the Vista Irrigation District to encourage water conservation, expand emergency water storage capacity, protect water quality, and explore, and promote more diverse sources of water.
- **A-3.2:** Continue to seek grants and other sources of funding, including the State Integrated Regional Water Management Grant Program and mitigation opportunities, to enhance flood control and improve water quality.

Potential Implementation Resources and Partners:

- California Strategic Growth Council; State Water Resources Control Board; California Department of Water Resources; Vista Irrigation District; California Office of Emergency Management; The San Diego Foundation

Measure A-4: Biodiversity and Habitats

GHG Reduction Potential:
NA
City Cost:
Low
City Savings:
None
Private Cost:
None
Savings:
None

Protect biodiversity and habitats from anticipated climate change effects.

As a result of past development patterns, only a few areas of natural habitat remain within Vista, much of which is concentrated along the major watercourses and natural drainages, such as Buena Vista, Agua Hedionda, and Buena Creeks. Substantial open space areas with plant communities and habitats include portions of Guajome Regional Park in the northwest corner of the city, and natural areas in and around Dawson-Los Monos Canyon Reserve, Buena Vista Park, and La Mirada Canyon in the southern portion of the city. Several natural open space corridors also occur along the outer edges of the city and internally along waterways and drainages.

The City is part of the North County Multiple Habitat Conservation Program (MHCP), which was adopted by SANDAG in 2003. The MHCP is a comprehensive sub-regional conservation planning effort developed to identify and conserve approximately 20,000 acres of habitat for the protection of a wide range of plant and animal species in North San Diego County.

A key to protecting biological resources is to preserve the open spaces in which they exist. Goals and policies within the Resource Conservation and Sustainability Element of General Plan 2030 provide the City with an opportunity to preserve, enhance, and restore open space areas for the protection of wildlife habitats, and plant and animal species, as well as the protection of public health and safety through land use designations, the development review process, acquisitions, and implementing the provisions of the MHCP Plan through a Biological Preserve Overlay. The goals, policies, and implementing actions describe the efforts the City will take to preserve, protect, and enhance important and sensitive biological resources.

Existing and/or Completed Efforts in Support of Measure:

- The City is part of the North County MHCP Plan, which was adopted by SANDAG in 2003.
- General Plan 2030, adopted in 2012, protects biodiversity and habitats within Vista through the following land use designations: Open Space Residential (OSR), Rural Residential (RR), Open Space (OS), and Biological Preserve Overlay (BPO).

Implementation Actions:

- **A-4.1:** In areas that are adjacent to sensitive vegetation and/or wildlife communities, continue to require development, uses, and activities to be designed and managed to ensure minimal impacts to those resources.
- **A-4.2:** Through the development review process, ensure that new development or redevelopment located in or near areas that may pose public health and safety hazards (such as fire hazard

zones) is designed to minimize potential impacts on people and property.

- **A-4.3:** Acquire or otherwise protect, where possible, open space and other properties that contain or protect significant natural habitat or sensitive resources.
- **A-4.4:** Establish maintenance and management standards for the Biological Preserve Overlay to ensure permanent conservation. The City's standards shall be based on the applicable standards in Section 6.0 of the Final MHCP Plan (i.e., Fire Management; Habitat Restoration; Erosion Control; Landscaping Restrictions; Recreation and Public Access; Fencing, Signs and Lighting; Predator and Exotic Species Control; Hydrology and Flood Control; and Species Reintroduction), subject to the availability of permanent funding.

Potential Implementation Resources and Partners:

- U.S. Fish and Wildlife Service; California Department of Fish and Game; California Natural Resources Agency; California Department of Fish and Game; California Wildlife Conservation Board; SANDAG; other local and regional jurisdictions and agencies

Measure A-5: Energy Supply

Facilitate a reliable energy supply.

GHG Reduction Potential:
NA
City Cost:
Low
City Savings:
None
Private Cost:
None
Savings:
None

The sustainable use and management of energy is essential to address many significant energy-related issues, including meeting the City's increasing energy demands, and reducing the impact that energy production has on human health, the environment, and GHG emissions and climate change.

Existing and/or Completed Efforts in Support of Measure:

- None at this time.

Implementation Actions:

- **A-5.1:** Implement the CAP measures that facilitate energy efficiency and renewable energy generation.

Potential Implementation Resources and Partners:

- U.S. Department of Energy; California Energy Commission; California Public Utilities Commission; SDG&E; California Center for Sustainable Energy; San Diego Energy Resource Center; Institute for Local Government; San Diego Renewable Energy Society; CleanTECH San Diego

3.8 GHG Reduction Summary

As discussed in Section 2.4 of Chapter 2 *GHG Emissions and Reduction Target*, Vista will need to reduce its emissions by 27,187 MT CO_2e by 2020 to meet its 15 percent reduction target. The GHG reduction measures in this CAP are estimated to reduce Vista's GHG emissions by 32,033 MT CO_2e by 2020, as summarized in **Table 3-7**. Therefore, the implementation of the measures identified in this chapter would ensure that Vista meets its 15 percent reduction target by 2020.

Table 3-7: Summary of GHG Reductions by Measure

Measure Number	Measure	2020 GHG Reduction (MT CO_2e)
Municipal Operations		
M-1	CAP Implementation	NA
M-2	Energy Efficient Lighting and Equipment	334
M-3	Renewable Energy	77
M-4	Employee Commute Alternatives	56
M-5	Municipal Recycling	22
Energy		
E-1	Energy Efficiency Building Standards	3,994
E-2	Energy Efficiency in Existing Buildings	4,461
E-3	Smart Meters	3,629
E-4	Small-Scale Renewable Energy Installations	3,712
E-5	Tree Planting and Urban Forests	126
Transportation & Land Use		
T-1	Bicycle and Pedestrian Travel	1,745
T-2	Transit Travel	1,912
T-3	Commute Trip Reduction	2,420
T-4	Smart Growth	4,962
Solid Waste		
S-1	Expanded Recycling	2,711
S-2	Construction and Demolition Debris Diversion	1,872
Community Education and Outreach		
C-1	Community Education and Outreach	Supporting
TOTAL REDUCTION		**32,033**

ENDNOTES

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CHAPTER 4

IMPLEMENTATION AND MONITORING

4.0 Implementation and Monitoring

Implementation and monitoring are essential components of the CAP to ensure that Vista reduces its GHG emissions and meets its target. This chapter identifies key steps that the City will take to implement the CAP and monitor the progress in reducing Vista's GHG emissions consistent with AB 32. It also describes potential funding sources and mechanisms available to implement the CAP.

4.1 Implementation

Ensuring that the CAP measures translate into measurable reductions in GHG emissions is critical to the success of the CAP. To facilitate this, each measure and its corresponding implementation actions identified in Chapter 3, *Climate Action Measures*, is listed in the implementation matrix in **Table 4-1** along with the following items:

- **Responsible Department:** The City department that will be primarily responsible for implementing, monitoring, and reporting on the progress of the selected measure and corresponding actions.
- **Implementation Time Frame:** The phase in which this measure should begin implementation. Timeframes include:
    - Near-Term – By 2013
    - Mid-Term – 2014-2016
    - Long-Term – 2017-2020
- **City Cost and Savings Estimates:** For each measure, potential costs and savings to the City are categorized as low ($0-$10,000), medium ($10,001-$100,000), and high ($100,001 or greater). Supporting information on costs and savings is provided in Appendix C.
- **GHG Reduction Potential:** The GHG reduction potential value identifies the estimated annual emission reductions anticipated by 2020, measured in MT CO_2e per year. Supporting information pertaining to the reduction calculations is provided in Appendix B.
- **Performance Indicator:** Performance indicators enable the City to track measure implementation and generally monitor progress.

Upon adoption of the CAP, the City will establish a CAP Coordinator who will provide essential CAP oversight and a multi-departmental CAP Implementation Team comprised of key staff in each department. These individuals will facilitate and oversee the implementation and monitoring of measures for which their department is responsible. The CAP Implementation Team will meet at least one time per year to assess the status of City efforts. Some actions will require interdepartmental or inter-agency cooperation and appropriate partnerships will need to be established accordingly.

Table 4.1: Implementation Matrix

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Municipal Operations							
Measure M-1: CAP Implementation. Establish a City CAP Coordinator and multi-departmental CAP Implementation Team to implement, monitor, and report on the status of measures and actions identified in the CAP.	**M-1.1:** Form a multi-departmental CAP Implementation Team that meets annually to implement, monitor, and report on the status of measures and actions identified in the CAP. **M-1.2:** Designate a City staff member on the CAP Implementation Team to have lead responsibilities for implementing the CAP and monitoring progress. Duties of this position include coordinating the CAP Implementation Team, preparing the annual CAP progress report to City Council, and coordinating the GHG emissions inventory and CAP updates. **M-1.3:** Provide CAP implementation and GHG reduction training to City staff.	Community Development	Medium	None	N/A	CAP Coordinator and CAP Implementation Team established and one City staff training within one year of CAP adoption; CAP Implementation Team meetings held annually through 2020	Near-Term
Measure M-2: Energy Efficient Lighting. Increase the efficiency of City-owned or -operated lighting.	**M-2.1:** Identify and secure additional funding to replace incandescent and mercury vapor street and traffic signal lights with LED, or other energy efficient lamps. **M-2.2:** Identify and secure funding to replace inefficient outdoor lights at City buildings and facilities as identified in the Vista Energy Roadmap.	Public Works	Low	High	334	80% of street and traffic lights replaced by 2020 (3,174 lights); Vista Energy Roadmap outdoor lighting project completed by 2020.	Mid-Term
Measure M-3: Renewable Energy. Continue to install renewable energy systems on City property.	**M-3.1:** Identify cost-effective renewable energy opportunities for additional City properties and apply for federal, state, and utility grants and other funding opportunities when they become available.	Public Works, Administrative Services	Low	Medium	77	150 kilowatts of solar installed by 2020	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Measure M-4: Employee Commute Alternatives. Provide information and incentives to City employees to increase carpooling, public transit use, bicycling, and walking in order to reduce vehicle miles traveled associated with employee commute.	**M-4.1:** Provide information on SANDAG's free iCommute program to develop and implement a commuter benefit program, such as discounted transit passes. **M-4-2:** Promote and participate in annual regional commute trip reduction events.	Community Development	Low	Low	56	5% reduction in City employee commute VMT by 2020	Mid-Term
Measure M-5: Municipal Recycling. Increase the amount of municipal solid waste recycled by 10%.	**M-5.1:** Identify City-owned or -operated facilities that need recycling receptacles, such as parks and recreational facilities. Install receptacles at appropriate locations and post signs to encourage recycling at these locations.	Public Works	Low	None	22	10% reduction in waste generated by City facilities by 2020	Long-Term
Energy							
Measure E-1: Energy Efficiency Building Standards. Ensure that new development complies with the energy efficiency and green building standards identified in Title 24 of the California Code of Regulations.	**E-1.1:** Continue to enforce the California Energy Code and the CALGreen Code through the development review process. **E-1.2:** Continue to provide information and forms on the City's website to facilitate project compliance with the California Energy Code and CALGreen Code.	Community Development	None	None	3,994	100% of new development complies with Title 24, Part 6 , Building Energy Efficiency Standards and Part 11, the CALGreen Code, as amended	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Measure E-2: Energy Efficiency in Existing Buildings. Facilitate voluntary energy efficiency improvements and upgrades in existing residential, commercial, and industrial buildings within Vista.	**E-2.1:** Partner with SDG&E to provide and promote energy efficiency and conservation education, training, rebates, and incentives to Vista residents, businesses, and employees. **E-2.2:** Provide information on the City's website related to steps that residents and businesses can take to conserve energy and increase efficiency, including links to energy efficiency and conservation programs and websites, such as Energy Upgrade California and Flex Your Power. **E-2.3:** Participate in and promote an energy efficiency financing program (through CaliforniaFIRST, Energy Upgrade California, a Property Assessed Clean Energy [PACE] program, a joint powers authority with neighboring jurisdictions, or other mechanisms) allowing residential and commercial property owners to voluntarily invest in energy efficiency upgrades for their buildings.	Community Development, Communications	Low	None	4,461	15% of buildings implement energy efficiency improvements, with an average efficiency improvement of 15% by 2020 (equivalent to a 2.3% total reduction in energy consumption).	Mid-Term
Measure E-3: Smart Meters. Increase the community's awareness, understanding and use of real-time energy consumption data and pricing available through SDG&E's Smart Meter program.	**E-3.1:** Assist SDG&E in its efforts to educate residents and business owners about Smart Meters, how to monitor electricity use, and the potential benefits associated with Smart Meters. **E-3.2:** Inform the community of metering options, such as online applications and in-home monitors. **E-3.3:** Connect residents and businesses with rebate and incentive programs that give priority to appliances with smart grid technology through the City's website.	Community Development, Communications	Low	None	3,629	3.7% reduction in residential electricity consumption; 2.3% reduction in non-residential electricity consumption by 2020.	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Measure E-4: Small-Scale Renewable Energy Installations. Facilitate the installation and use of small-scale renewable energy systems, such as solar photovoltaic panels, on new and existing buildings.	**E-4.1:** Continue to participate in a renewable energy financing program to allow property owners in Vista to finance the installation of on-site solar photovoltaic and hot water systems. **E-4.2:** Provide links to programs and websites that offer technical and financial assistance and incentives through the City's website. **E-4.3:** Develop and adopt a policy or program that offers incentives, such as expedited permit processing or reduced fees, to encourage the installation of renewable energy systems on new or existing buildings.	Community Development, Communications	Low	None	3,712	4,690 kilowatts of solar installed by 2020; 907 solar hot water heaters installed by 2020.	Mid-Term
Measure E-5: Tree Planting and Urban Forests. Preserve and increase the amount of urban forest within the City.	**E-5.1:** Update the Street Tree, Shrubs and Plants Ordinance to ensure the effectiveness of preserving and sustaining the city's urban forest. **E-5.2:** Identify and secure grant funding to prepare an updated Urban Forest Management Plan.	Public Works, Community Development, Administrative Services	Low	Medium	126	500 trees planted by 2020	Long-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Transportation and Land Use							
Measure T-1: Bicycle and Pedestrian Travel. Continue to expand and improve the City's bicycle and pedestrian network.	**T-1.1:** Continue to pursue public and private funding to expand and link the City's bicycle and pedestrian network in accordance with the General Plan 2030 Circulation Element. **T-1.2:** Incorporate multi-modal improvements into pavement resurfacing, restriping, and signalization operations where the safety and convenience of users can be improved within the scope of work. **T-1.3:** Establish minimum design criteria for pedestrian circulation and implement through the design review process. **T-1.4:** Through the development review process: (a) ensure that the street right-of-way is designed to accommodate and connect appropriate modes of transportation; (b) continue to enforce mandatory CALGreen Code bicycle parking standards; (c) require proposed development to provide facilities for pedestrian travel, such as sidewalks, and provide pedestrian access to the development via sidewalks; (d) require proposed development to provide bike facilities within the right-of-way for Class II bikeways in the project vicinity on all arterial roadways where deemed appropriate. Where Class II bikeways are not feasible, require Class III bike routes to be provided as a temporary measure. Implement through conditions of approval.	Community Development, Public Works, Engineering	Low	None	1,745	2% mode shift from single-occupant vehicle to walking and biking	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Measure T-2: Transit Travel. Continue to expand and improve the transit network and its accessibility within Vista.	**T-2.1:** Coordinate with NCTD to continue to expand local rail and bus service to and within Vista. **T-2.2:** Support the efforts of SANDAG and NCTD to double-track the SPRINTER line and allow for grade separation projects at major intersections in the City. **T-2.3:** Coordinate with NCTD to maintain and upgrade transit stops to provide safe, attractive, and clearly identifiable stops throughout the community. **T-2.4:** Coordinate with SANDAG to maintain the current Park and Ride facility and add more facilities if the demand warrants. **T-2.5:** Through the development review process, require the construction of bus turnouts with shelters adjacent to new projects where transit demand warrants such improvements. Implement through conditions of approval. **T-2.6:** Coordinate with SANDAG to identify and implement Safe Routes to Transit projects within Vista to increase transit as a viable travel option.	Community Development, Engineering	Low	None	1,912	2% mode shift from single-occupant vehicles to transit	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Measure T-3: Commute Trip Reduction. Promote SANDAG's regional commute trip reduction program that gives commuters and employers resources and incentives to reduce their single-occupancy automobile trips.	**T-3.1:** Provide information on, and links to commuter assistance programs and employer services offered through SANDAG's iCommute program on the City's website. **T-3.2:** Work with the Chamber of Commerce, Vista Village Business Association, and other business support groups, to promote commute trip reduction programs, such as iCommute, with an emphasis on employer services.	Community Development, Economic Development	Low	None	2,420	1% mode shift from single-occupant vehicle to carpool or vanpool; 1% reduction in commute trips from telecommuting	Long-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Measure T-4: Smart Growth. Facilitate smart growth and mixed-use development within the Opportunity Areas identified in the General Plan 2030.	**T-4.1:** Revise the City's zoning designations, development standards, and design guidelines to be consistent with the General Plan 2030 Land Use and Community Identity Element. **T-4.2:** Develop and offer incentives for mixed-use, transit-oriented, and affordable housing projects in designated SANDAG Smart Growth Areas (and/or General Plan 2030 Opportunity Areas), including reduced parking requirements and expedited permit processing. **T-4.3:** Work with SANDAG to achieve regional smart growth goals through implementation of the Regional Comprehensive Plan and Smart Growth Concept Map, as identified in the Opportunity Areas and supporting goals and policies throughout General Plan 2030. **T-4.4:** Encourage SANDAG to update the Smart Growth Map to incorporate changes consistent with General Plan 2030. **T-4.5:** Through the development review process, evaluate mixed-use development projects based on consistency with the City's adopted General Plan 2030, updated zoning regulations, and adopted Design Guidelines, as well as SANDAG Smart Growth publications including: (a) Designing for Smart Growth, Creating Great Places in the San Diego Region; (b) Planning and Designing for Pedestrians, Model Guidelines for the San Diego Region; (c) Trip Generation for Smart Growth; and (d) Parking Strategies for Smart Growth.	Community Development	Low	None	4,962	5% of residences located in mixed-use or transit-oriented development by 2020	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Solid Waste							
Measure S-1: Expanded Recycling. Create a mandatory solid waste recycling program for multi-family residences and commercial operations.	**S-1.1:** Coordinate with EDCO to implement a multi-family residential and commercial solid waste recycling program that consists of education, outreach, and monitoring.	Public Works	None	None	2,711	95% of multi-family residences and commercial operations with access to solid waste recycling	Near-Term
Measure S-2: Construction Waste Diversion. Require the redirection of at least 50 percent of the total construction and demolition debris generated by a project via reuse or recycling.	**S-2.1:** Continue to implement through the development review process.	Community Development, Public Works	None	None	1,872	100% compliance	Near-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Community Education and Outreach							
Measure C-1: Community Education and Outreach. Develop a public outreach program to increase public awareness of potential climate change impacts, the City's GHG reduction efforts, and actions community members can take to reduce their GHG emissions.	**C-1.1:** Create a climate action page on the City's website and update every six months. **C-1.2:** Establish a section in the City newsletter that raises awareness of climate change and ways to reduce GHG emissions, with an emphasis on cost savings and benefits. **C-1.3:** Recognize individuals, groups, or businesses that have made changes to reduce their GHG emissions on the City's climate action page or in the City newsletter.	Communications, Community Development	Low	None	Supporting Measure	2 webpage updates per year; City newsletter issued three times per year with content to educate and engage Vista community members	Mid-Term
Adaptation (A)							
Measure A-1: Climate Change Vulnerability. Identify and periodically reassess regional climate change vulnerabilities.	**A-1.1:** Participate in inter-agency and/or inter-jurisdictional meetings and planning activities to identify and periodically reassess regional climate change vulnerabilities. **A-1.2:** Incorporate newly identified adaptation measures into planning documents as appropriate.	Community Development	Low	None	NA	NA	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Measure A-2: Public Health and Safety. Help protect the public from potential increases in hazards and health risks due to climate change.	**A-2.1:** Continue to coordinate with the San Diego County Office of Emergency Services Office of Emergency Services to update the Multi-Jurisdictional Hazard Mitigation Plan to address the hazards and public health risks associated with climate change. **A-2.2:** Through the development review process, ensure that new development located in or near areas that may pose public health and safety hazards (such as flood plains and fire hazard zones) is designed to avoid and/or minimize potential impacts on people and property. **A-2.3:** Collaborate with community-based organizations (such as health care providers, public health advocates, fire prevention organizations, etc.) to disseminate public preparedness and emergency response information related to climate change. Provide information on the City's website.	Engineering, Fire Department, Recreation & Community Services, Communications	Low	None	NA	NA	Mid-Term
Measure A-3: Water Resources. Prepare for anticipated climate change effects on water resources.	**A-3.1:** Continue to coordinate with the Vista Irrigation District to encourage water conservation, expand emergency water storage capacity, protect water quality, and explore and promote more diverse sources of water. **A-3.2:** Continue to seek grants and other sources of funding, including the State Integrated Regional Water Management Grant Program, and mitigation opportunities to enhance flood control and improve water quality.	Community Development, Engineering, Communications	None	None	NA	NA	Mid-Term

Measure	Actions	Responsible Department	City Cost	City Savings	2020 GHG Reduction (MT CO_2e)	Performance Indicator	Implementation Time Frame
Measure A-4: Biodiversity and Habitats. Protect biodiversity and habitats from anticipated climate change effects.	**A-4.1:** In areas that are adjacent to sensitive vegetation and/or wildlife communities, continue to require development, uses, and activities to be designed and managed to ensure minimal impacts to those resources. **A-4.2:** Through the development review process, ensure that new development or redevelopment located in or near areas that may pose public health and safety hazards (such as fire hazard zones) is designed to minimize potential impacts on people and property. **A-4.3:** Acquire or otherwise protect, where possible, open space and other properties that contain or protect significant natural habitat or sensitive resources. **A-4.4:** Establish maintenance and management standards for the Biological Preserve Overlay to ensure permanent conservation. The City's standards shall be based on the applicable standards in Section 6.0 of the Final MHCP Plan (i.e., Fire Management; Habitat Restoration; Erosion Control; Landscaping Restrictions; Recreation and Public Access; Fencing, Signs and Lighting; Predator and Exotic Species Control; Hydrology and Flood Control; and Species Reintroduction), subject to the availability of permanent funding.	Community Development	None	None	NA	NA	Near-Term
Measure A-5: Energy Supply. Facilitate a reliable energy supply.	**A-5.1:** Implement the CAP measures that facilitate energy efficiency and renewable energy generation.	NA	None	None	NA	NA	Mid-Term

4.2 Monitoring

This section describes how the City will monitor the CAP's implementation and performance, and if necessary, alter or amend the CAP to ensure that the plan remains effective and on track toward meeting its target. The City will use two important types of monitoring: evaluation of the individual measures and evaluation of the plan as a whole.

4.2.1 MEASURE EVALUATION

The City CAP Coordinator, in coordination with the CAP Implementation Team, will be responsible for developing an annual progress report to the City Council that identifies the implementation status of each measure, evaluates achievement of or progress toward performance indicators (where applicable), assesses the effectiveness of various actions and programs included in the Plan, and recommends adjustments to actions or tactics, as needed. The progress indicators, provided for each quantified measure, identify the level of participation and performance required to achieve the estimated level of GHG emission reduction by 2020. By evaluating whether the implementation of a measure is on track to achieve its progress indicators, the City can identify successful measures and re-evaluate or replace under-performing ones. This evaluation may be submitted to the City Council in conjunction with the General Plan status report for that year as required by State Government Code Section 65400.

4.2.2 PLAN EVALUATION

To evaluate the performance of the CAP as a whole, the City will update the community and municipal GHG inventories every five years using the most up-to-date calculation methods, data, and tools, and will complete the 2010 inventory by December 31, 2014. Inventory updates provide the best indication of CAP effectiveness as they will allow for comparison to the 2005 baseline. If an update reveals that the plan is not making progress toward meeting the GHG reduction target, the City will adjust the measures as necessary.

The City CAP Coordinator, in coordination with the CAP Implementation Team, will be responsible for initiating the inventory updates as well as reporting on the results and progress toward the target in the annual report to the City Council for that year. In addition, the report will include an assessment of the implementation of applicable AB 32 Scoping Plan measures to determine whether adjustments to the CAP must be made to account for any shortfalls in AB 32 Scoping Plan implementation.

At this time, the State has not set an emission reduction target beyond 2020, although it has a long-term goal of reducing emissions to 80 percent below 1990 emissions levels by 2050. As such, this CAP does not identify a target beyond 2020. As the year 2020 approaches, the State is likely to adopt a target for later years and, at that time, Vista will adopt a reduction target for 2030 consistent with the State's reduction trajectory. However, if the State has not adopted a reduction target for 2030 by 2020, the City will set a reduction target based on the State's long-term reduction trajectory. In addition, by 2020, the City will update the CAP to include reduction measures to achieve the adopted 2030 reduction goal.

4.3 Funding Sources

One of the main barriers to an implementation and monitoring plan is lack of available funds. There are multiple grant and loan programs through state, federal, and regional sources to reduce GHG emissions.

This section identifies potential funding sources that Vista could pursue to offset the financial cost of implementing the CAP measures.

The spectrum of public and private funding options for the measures outlined in this CAP is ever evolving. The programs listed below represent the current (2012) status of those options that are most relevant to the CAP. These funding sources could quickly become out-of-date; therefore, it is important to evaluate the status of a given program before seeking funding, as availability and application processes are updated periodically. In addition, there are general sources of funding that provide the most up-to-date information and should be reviewed on a regular basis, including:

- U. S. Department of Energy
- U.S. Environmental Protection Agency
- U.S. Department of Housing and Urban Development
- California Energy Commission
- California Strategic Growth Council
- Caltrans
- CAL FIRE
- SANDAG
- SDG&E

To reduce costs and improve the CAP's effectiveness, actions should be pursued concurrently whenever possible. Which funding sources the City decides to pursue will be addressed as implementation occurs.

The City can, in part, provide funding for various measures outlined in this CAP. This can be accomplished through the City's annual budgeting and Capital Improvement Program process which provides an opportunity for citizen input and guides decision-makers while helping them set priorities. The City can also partner with SANDAG, local jurisdictions within San Diego County, community-based organizations, and private companies for joint programs.

4.3.1 ENERGY-RELATED FUNDING SOURCES

Many of the financing and incentive programs relevant to the CAP concern energy infrastructure and conservation. Some of these programs are tied to the ARRA economic stimulus package enacted by Congress in February 2009. Access to these funds will be available for a limited period. The City should seek the most up-to-date information regarding the programs listed below.

Strategic Growth Council Sustainable Communities Planning Grant Program

California Strategic Growth Council

On behalf of the Strategic Growth Council, the Department of Conservation manages competitive grants to cities, counties, and designated regional agencies to promote sustainable community planning and natural resource conservation. The grant program supports development, adoption, and implementation of various planning elements. The Sustainable Communities Planning Grant Program offers a unique opportunity to

improve and sustain the wise use of infrastructure and natural resources through a coordinated and collaborative approach.

Urban Greening for Sustainable Communities Grant Program

California Strategic Growth Council

Because of the built-out nature of California's urban areas, the Urban Greening for Sustainable Communities Program provides funds to preserve, enhance, increase, or establish community green areas such as urban forests, open spaces, wetlands, and community spaces (e.g., community gardens). The goal is for these greening projects to incrementally create more viable and sustainable communities throughout the state. This program has both an **Urban Greening Planning Program**, which provides funds to assist entities in developing a master urban greening plan, and an **Urban Greening Project Program**, which provides funds for projects that preserve, enhance, increase or establish community green areas.

Urban and Community Forestry Grant Program

CAL FIRE

The CAL FIRE Urban and Community Forestry Program works to expand and improve the management of trees and related vegetation in communities throughout California. This program offers funding through a variety of grants. The **Urban Forest Management Plan Grant** funds the development and implementation of a management plan to be used by a jurisdiction to manage its urban forest. Such plans will be holistic and long-term, must include the entire jurisdiction and take an ecosystem management approach, and may include a minimum level of a training or educational component. Local jurisdictions may request between $30,000 and $100,000 and matching contributions totaling 25 percent of the total project cost is required. The **Green Trees for the Golden State Grant** provides funding for urban tree planting projects and up to two years of initial maintenance. Local jurisdictions may request between $30,000 and $100,000. Matching contributions totaling 25 percent of the total project cost is required.

California Inventor Owned Utilities (IOUs) Programs

SDG&E

California IOU's, such as SDG&E, are required by the CPUC to offer energy efficiency programs to their customers. Each IOU program is unique; generally the programs offer rebates, financing assistance, design assistance, educational seminars, and other forms of assistance. Rebates are typically a set amount of financial assistance for a specific energy efficiency technology, although SDG&E also offers custom rebate programs that are more flexible.

In conjunction with its rebates and incentives programs, SDG&E offers On-Bill Financing. On-Bill Financing provides interest-free, unsecured financing to qualified commercial and taxpayer-funded customers for the installation of energy-efficient upgrades. Financed equipment must qualify for a rebate or incentive from SDG&E's rebate/incentive program(s). The program for public agencies, such as the City of Vista, includes: zero-percent financing on qualifying measures for up to ten years; offsets to energy-efficient upgrade costs after rebates and incentives through SDG&E; loan amounts that range from a minimum of $5,000 up to $250,000 per meter; and loan installments that are added to monthly SDG&E bills

Energy Conservation Assistance Account Program (ECAA) Energy Efficiency Financing

California Energy Commission

The CEC offers low-interest loans (one-three percent) to help local jurisdictions and other public agencies finance energy-efficient projects as part of the ECAA Program. Projects with proven energy and/or capacity

savings are eligible, provided they meet the eligibility requirements. Examples of projects include: lighting systems, pumps and motors, energy efficient streetlights and traffic signals, automated energy management systems/controls, building insulation, renewable energy generation and combined heat and power projects, heating and air conditioning modifications, and waste water treatment equipment. The maximum loan amount is $3 million per application for 15 years. There is no minimum loan amount.

California Solar Initiative State Rebate Program

California Energy Commission & California Public Utilities Commission

California Solar Initiative will provide over $2 billion in statewide incentives over the next decade for solar photovoltaic systems, as well as other solar thermal generating technologies, such as water heaters, on existing residential homes, and existing and new commercial, industrial, and agricultural properties. Photovoltaic incentives are available for systems up to one megawatt in size for homeowners, commercial/industrial, government and non-profit customers. The program pays solar consumers an incentive based on system performance.

California Feed-In Tariff

The California feed-in tariff allows eligible customer-generators to enter into 10-, 15- or 20-year standard contracts with their utilities to sell the electricity produced by small renewable energy systems -- up to three megawatts -- at time-differentiated market-based prices. Time-of-use adjustments will be applied by each utility and will reflect the increased value of the electricity to the utility during peak periods and its lesser value during off-peak periods. These tariffs are not available for facilities that have participated in the California Solar Initiative, Self-Generation Incentive Program, Renewables Portfolio Standard, or other ratepayer funded generation incentive programs, including net-metering tariffs. For customers generating renewable energy not covered by the California Solar Initiative or Self-Generation Incentive Program (e.g., biomass or geothermal) the feed-in tariff is applicable. If customers prefer a long-term contract at a fixed price over a financial incentive paid in the short term, feed-in tariffs may be a beneficial financing tool.

Training and Certification Programs

SDG&E

SDG&E offers free inspector training for City employees. Curriculum includes equipment identification and compliance, residential and commercial California Energy Code documentation and compliance, building plan verification for energy-efficiency standards, and 2010 California Green Building Code. Other training and certification programs SDG&E offers to City staff at no cost or a reduced rate include Building Operator Certification, Certified Energy Manager, and LEED® Professional Credentials.

4.3.2 TRANSPORTATION-RELATED FUNDING SOURCES

Many federal, state, and regional grant programs are available to fund transportation and infrastructure improvements. The programs listed below represent the current status of the most relevant of these programs.

Livability Grant Program

Federal Transportation Authority

The Federal Transportation Authority provides resources on sustainable communities and transit oriented development. Resources include access to transit oriented development resources and training free of

charge to local government employees. The Federal Transportation Authority's Livable and Sustainable Communities program supports initiatives that demonstrate ways to improve the link between public transit and communities. The Federal Transportation Authority's Livability Grant Program offers funding to communities for the opportunity to create these accessible, livable, and sustainable communities.

Community-Based Transportation Planning Grant Program

Caltrans

The Community-Based Transportation Planning Grant Program is primarily used to seed planning activities that encourage livable communities. Grants assist local agencies to better integrate land use and transportation planning, to develop alternatives for addressing growth, and to assess efficient infrastructure investments that meet community needs. These planning activities are expected to help leverage projects that foster sustainable economies, increase available affordable housing, improve housing/jobs balance, encourage transit oriented and mixed use development, expand transportation choices, reflect community values, and include non-traditional participation in transportation decision making.

Local Assistance Program

Caltrans

Caltrans' Local Assistance Program oversees more than one billion dollars in federal and state funds annually available to over 600 cities, counties, and regional agencies for the purpose of improving their transportation infrastructure or providing transportation services.

Safe Routes to School Programs

Caltrans

Caltrans administers two separate Safe Routes to School Programs—one state program and one federal program. Both programs are intended to achieve the same basic goal of increasing the number of children walking and bicycling to school by making it safer for them to do so. Both programs fund qualifying infrastructure projects.

Bicycle Transportation Account

Caltrans

The Bicycle Transportation Account is an annual program providing state funds for city and county projects that improve safety and convenience for bicycle commuters.

Environmental Enhancement and Mitigation Program

Caltrans

The Environmental Enhancement and Mitigation Program offers a total of $10 million each year for grants to local, state, and federal government agencies and to nonprofit organizations for projects to mitigate the environmental impacts caused by new or modified public transportation facilities. Eligible projects must be directly or indirectly related to the environmental impact of the modification of an existing transportation facility or construction of a new transportation facility. Two of the grant categories include **Highway Landscaping and Urban Forestry Projects**, which are designed to offset vehicular emissions of carbon dioxide through the planting of trees and other suitable plants, and **Roadside Recreation Projects**, which provide for the acquisition and/or development of roadside recreational opportunities.

Community Development Block Grant

California Department of Housing and Community Development

The Community Development Block Grant (CDBG) program funds projects and programs that develop viable urban communities by providing decent housing and a suitable living environment and by expanding economic opportunities, principally for persons of low and moderate income. Federal CDBG Grantees may use funds for activities that include, but are not limited to, acquiring real property; building public facilities and improvements, such as streets, sidewalks, and recreational facilities; and planning and administrative expenses, such as costs related to developing a consolidated plan and managing CDBG funds. The State makes funds available to eligible agencies (cities and counties) through a variety of different grant programs.

TransNet Smart Growth Incentive Program

SANDAG

SANDAG manages the *TransNet* Smart Growth Incentive Program (SGIP), which funds transportation and transportation-related infrastructure improvements and planning efforts that support smart growth development. The SGIP awards two percent of the annual *TransNet* revenues to local governments through a competitive grant program.

TransNet Environmental Mitigation Program

SANDAG

The TransNet Environmental Mitigation Program provides funding for mitigating local and regional transportation projects, as well as additional funding for acquiring, managing, and monitoring natural habitats in ways that support the San Diego region's habitat conservation programs.

TransNet/Transportation Development Act Active Transportation Program

SANDAG

SANDAG allocates funds under the Transportation Development Act Active Transportation Program to support bicycle, pedestrian, and traffic calming, planning and capital improvement projects in the San Diego region through a competitive process on an annual basis.

Healthy Works

SANDAG

Healthy Works provides grant funding from the American Recovery and Reinvestment Act through the Centers for Disease Control and County of San Diego to help local jurisdictions and non-profit organizations plan healthy communities by integrating public health considerations into planning efforts and promoting Safe Routes to School programs and strategies.

Infrastructure State Revolving Fund Program

California Infrastructure and Economic Development Bank

The Infrastructure State Revolving Fund Program provides low-cost financing to public agencies for a wide variety of infrastructure projects. Program funding is available in amounts ranging from $250,000 to $10 million, with loan terms of up to 30 years. Interest rates are set on a monthly basis. Eligible project categories include city streets, county highways, state highways, drainage, water supply and flood control, educational facilities, environmental mitigation measures, parks and recreational facilities, port facilities, public transit, sewage collection and treatment, solid waste collection and disposal, water treatment and distribution, defense conversion, public safety facilities, and power and communications facilities.

4.3.3 SOLID WASTE-RELATED FUNDING SOURCES

Beverage Container Recycling Grant and Payment Programs

California Department of Resources Recycling and Recovery (CalRecycle)

CalRecycle administers funding programs to assist organizations with establishing convenient beverage container recycling and litter abatement projects, and to encourage market development and expansion activities for beverage container materials. The **Beverage Container Recycling Grant** provides funding to local governments, businesses, individuals, and non-profit organizations for projects that implement new programs or enhance existing programs to provide convenient beverage container recycling opportunities in various locations statewide. Eligible projects include, but are not limited to, the following locations: parks and recreational areas, sporting complexes, community events, office buildings, multifamily dwellings, entertainment/hospitality venues, curbside, restaurants, and schools and colleges. CalRecycle issues up to $1.5 million annually for this program. The **City/County Payment Program** provides a total of $10.5 million in grant funds annually to eligible cities and counties for beverage container recycling and litter abatement activities. Each city is eligible to receive a minimum of $5,000 or an amount calculated by the Department based on per capita, whichever is greater.

4.3.4 OTHER FUNDING SOURCES

Community Assistance Grant

Bureau of Land Management

Funds are available to assist with hazardous fuels treatments, community wildfire protection planning, and education addressing wildfire safety and hazard risk reduction within the wildland-urban interface. Treatments may be focused on both Federal (with prior approval from local Bureau of Land Management field staff) and non-federal lands and aimed toward protecting communities at risk and resource values identified within a Community Wildfire Protection Plan and/or Community Fire Plans with an interdisciplinary and interagency collaborative process.

Wildland Urban Interface Grant

Fish and Wildlife Service

Wildland Urban Interface funds are available for hazard mitigation projects that protect communities at risk of wildfire by reducing hazardous fuels (non-federal lands), developing Community Wildfire Protection Plans (includes associated planning and compliance documents), and implementing wildfire education and outreach initiatives.

Partnerships with Other Jurisdictions and Community Organizations

Partnering with neighboring jurisdictions and community organizations is a key implementation strategy supporting the CAP. Various jurisdictions and organizations within the County could serve as potential partners in implementing the CAP strategies. The City should seek to partner with appropriate local governments, as identified within CAP measures.

CHAPTER 5

REFERENCES AND PREPARERS

5.0 References and Preparers

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APPENDIX A

CITY OF VISTA GHG EMISSIONS INVENTORY

City of Vista Greenhouse Gas Emissions Inventory

CITY OF VISTA
CALIFORNIA

Prepared by ICLEI – Local Governments for Sustainability (2009)
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The San Diego Foundation

Bob Kelly, President and Chief Executive Officer

With a dynamic mix of leadership, grant-making, and civic engagement, The San Diego Foundation makes the San Diego region a better place to live. Founded in 1975, The Foundation addresses evolving issues facing our region by convening community leaders, providing research and expertise on topics important to our citizens, and partnering with nonprofit organizations to meet urgent and changing needs. By working with individuals, families and organizations to carry out their giving plans, The San Diego Foundation utilizes charitable dollars toward the ultimate goal of improving the quality of life in the greater San Diego region, now and for generations to come.

www.sdfoundation.org

The San Diego Foundation launched Climate Smart as part of its Climate Change Initiative, to raise public awareness about the local implications of climate change and catalyze more comprehensive regional action on global warming. Climate Smart is a multi-year effort to bring government, business, the research community, and nonprofits together to tackle one of the greatest challenges of our time.

The Climate Initiative also supports efforts to engage local governments and public agencies to develop local climate action plans to reduce emissions and vulnerabilities to climate change in our region, bring more resources to support model programs to promote "green" economic growth and build a more sustainable region and build public awareness and support for climate action.

ICLEI-Local Governments for Sustainability USA

Jeb Brugmann, Interim Executive Director

ICLEI-Local Governments for Sustainability USA (ICLEI) is a membership association of more than 1,000 local governments worldwide—more than 500 in the United States—committed to advancing climate protection and sustainability. Through technical expertise, direct network engagement, and the innovation and evolution of tools, ICLEI strives to empower local governments to set and achieve their emissions reduction and sustainability goals.

http://www.icleiusa.org

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Executive Summary

The City of Vista has recognized that human-caused climate change is a reality, with potentially disruptive effects to Vista's residents and businesses. The City also recognizes that local governments play a leading role in both reducing greenhouse gas emissions and adapting to the potential impacts of climate change. Local governments can dramatically reduce emissions from their government operations through such measures as increasing energy efficiency in facilities and vehicle fleets, utilizing renewable energy sources, enacting sustainable purchasing policies, reducing waste, and supporting alternative modes of transportation for employees. The co-benefits of these measures may include lower energy bills, improved air quality, and more efficient government operations.

The City of Vista has begun its efforts to address the causes and effects of climate change with the assistance of the partners in the San Diego Regional Climate Protection Initiative. These partners include the San Diego Foundation; local governments in San Diego County; and ICLEI.

This greenhouse gas emissions inventory is an important first step in the City's climate protection initiative. As advised by ICLEI, it is essential to first quantify emissions to establish:

- A baseline emissions inventory, against which to measure future progress.
- An understanding of the scale of emissions from various sources.

Presented here are estimates of greenhouse gas emissions in 2005 resulting from the City of Vista's government operations and from the Vista community-at-large. With one exception,[1] all government operations emissions estimates in this report refer to emissions generated from sources over which the City has direct operational control, exclusive of physical location.[2] This includes all government-operated facilities, streetlights, and other stationary sources; the on-road vehicle fleet and off-road equipment; and waste generated by government operations. The

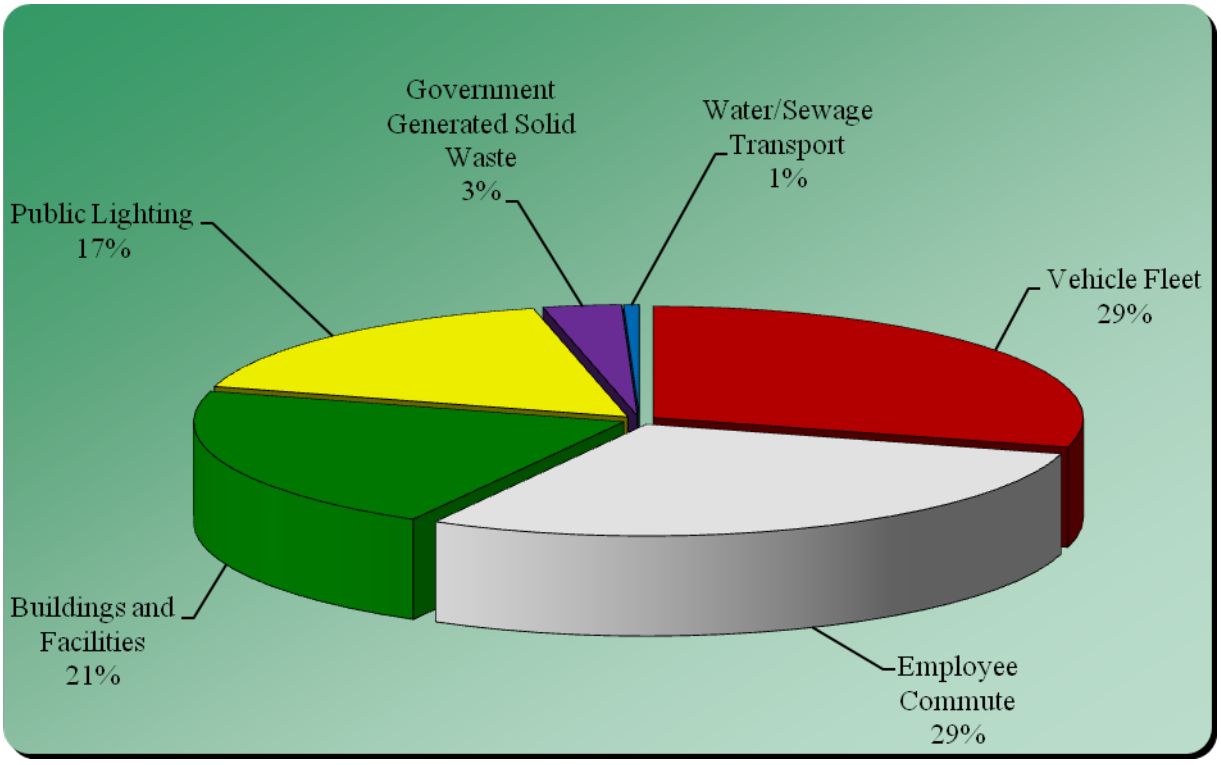
1 The exception is emissions from employee-owned vehicles that are used by employees during commuting.
2 Facilities, vehicles, or other operations wholly or partially owned by, but not operated by the City of Vista are not included in this inventory. See Appendix A for more details on the boundaries of the inventory.

inventory also estimates emissions from the community-at-large. Community-scale emissions are reported by five primary sectors: residential, commercial/industrial, transportation, waste, and wastewater.

Like all emissions inventories, this document must rely on the best available data and calculation methodologies. Emissions estimates are subject to change as better data and calculation methodologies become available in the future. Nevertheless, the findings of this analysis provide a solid basis upon which Vista can begin planning and taking action to reduce its greenhouse gas emissions.

This inventory is one of the first inventories to use a new national standard developed and adopted by the California Air Resources Board (ARB) in conjunction with ICLEI, the California Climate Action Registry, and The Climate Registry. This standard, called the Local Government Operations Protocol (LGOP), provides standard accounting principles, boundaries, quantification methods, and procedures for reporting greenhouse gas emissions from local government operations. The LGOP represents a strong step forward in standardizing how inventories are conducted and reported, providing a common national framework for all local governments to establish their emissions baseline.

Figure ES.1: 2005 City of Vista Government Operations Emissions by Sector



Government Operations Inventory Results

In 2005, the City of Vista's operational greenhouse gas emissions totaled 3,865 metric tons of CO_2e.[3] Of the total emissions accounted for in this inventory, emissions from the City's vehicle fleet and employee commutes were the largest (both 29 percent as shown in Figure ES.1 and Table ES.1). The next largest sources of emissions were from the operation of buildings and facilities.

Cumulatively, the City spent approximately $1,187,328 on energy for government operations in 2005. Of this total, 78 percent of these energy expenses ($927,731) resulted from electricity consumption and natural gas purchases from SDG&E. Fuel purchases (gasoline, diesel) for the vehicle fleet and mobile equipment totaled $259,597, or 22 percent of total costs included in this inventory. Cost data on refrigerants, diesel generator fuel use, and solid waste disposal are not included here. These figures demonstrate the potential for significantly reducing energy costs while also mitigating climate change impacts and helping to stimulate green job development and economic recovery.

Table ES.1: 2005 Vista Government Operations Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Vehicle Fleet	1,132
Employee Commute	1,114
Buildings and Facilities	823
Public Lighting	659
Government Generated Solid Waste	114
Water/Sewage Transport	23
TOTAL	**3,865**

Community Inventory Results

In 2005, the Vista community emitted approximately 547,039 metric tons of CO_2e. As shown in Figure ES.2 and Table ES.2 below, the transportation sector was by far the largest source of emissions, generating approximately 314,097 metric tons of CO_2e, or 57 percent of total 2005 emissions. Transportation sector emissions are the result of diesel and gasoline combustion in vehicles traveling on both local roads, and state highways that pass through the jurisdictional boundaries of Vista. Electricity and natural gas consumption within the commercial / industrial sector, the second greatest source of 2005 emissions, generated 108,749 metric tons CO_2e, or 20 percent of the total. Similarly, electricity and natural gas use in Vista's residential sector produced 89,534 metric tons CO_2e, or 16 percent of total community emissions. The remaining 7 percent (34,659 metric tons) are the estimated future methane emissions that will result from the decomposition of waste and wastewater that was generated by the Vista community during 2005.

3 This number represents a "roll-up" of emissions, and is not intended to represent a complete picture of emissions from the City of Vista's operations. This roll-up number should not be used for comparison with other local government roll-up numbers without a detailed analysis of the basis for this total.

Figure ES.2: 2005 City of Vista Community Emissions by Sector

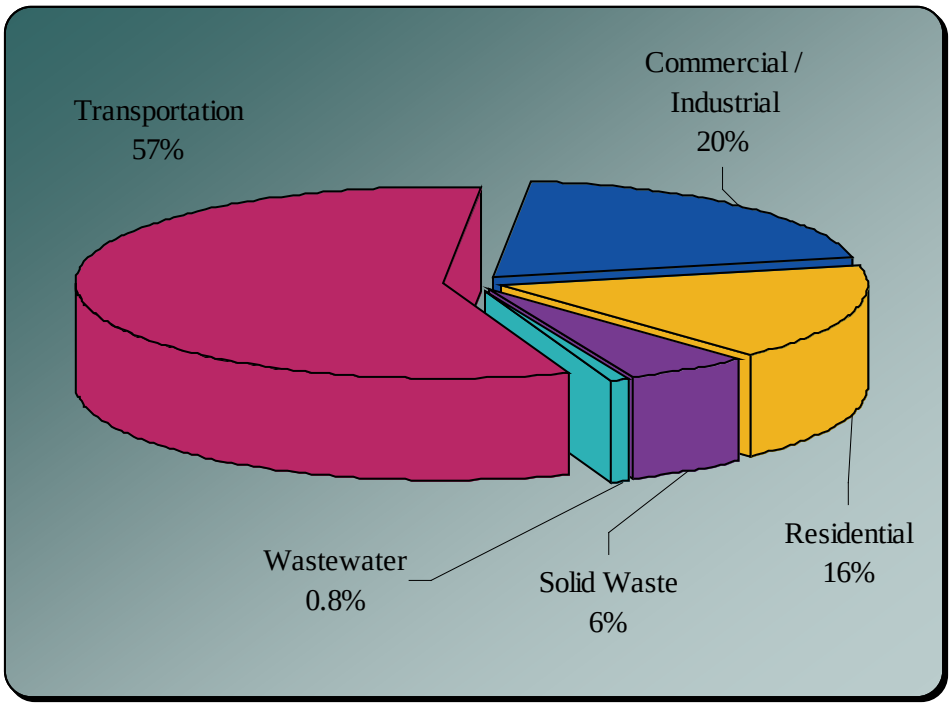


Table ES.2: 2005 Vista Community Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Transportation	314,097
Commercial / Industrial	108,749
Residential	89,534
Solid Waste	30,310
Wastewater	4,349
TOTAL	**547,039**

Section One: Introduction

Introduction

Local governments play a fundamental role in addressing the causes and effects of human-induced climate change through their actions at both the community and government operations levels. While local governments cannot solve the problems of climate change by themselves, their policies can dramatically reduce greenhouse gas emissions from a range of sources and can prepare their communities for the potential impacts of climate change.

Within the context of government operations, local governments have direct control over their emissions-generating activities. They can reduce energy consumption in buildings and facilities, reduce fuel consumption by fleet vehicles and equipment, reduce the amount of government-generated solid waste that is sent to a landfill, and increase the amount of energy that is obtained through alternative energy sources. By quantifying the emissions coming from government operations, this report will assist policymakers and stakeholders in addressing the City of Vista's institutional contribution to climate change.

Local jurisdictions in California also have broad influence over activities in the community that generate greenhouse gas emissions, such as new construction, the operation of buildings and transportation, and solid waste disposal. That influence may be exercised directly through the jurisdiction's authority over local land use planning and building standards, and indirectly through programs that encourage sustainable behavior among local residents and businesses. The community inventory provides a starting point for addressing how the City can impact emissions within its jurisdictional boundaries.

1.1 Climate Change Background and Potential Impacts

In the phenomenon known as the greenhouse effect, naturally-occurring atmospheric gases help regulate global climate by trapping solar radiation within the Earth's atmosphere. Overwhelming evidence suggests that modern human activity is artificially intensifying the greenhouse effect, causing global average surface temperatures to rise.

This intensification is caused by activities that release carbon dioxide and other greenhouse gases into the atmosphere—most notably the burning of fossil fuels for transportation, electricity, and heating.

Rising temperatures affect local and global climate patterns, and these changes are forecasted to manifest themselves in a number of ways that may impact the San Diego region. In 2008, a vulnerability assessment entitled the *San Diego Regional Focus 2050 Study* (Focus 2050) was prepared by the Scripps Institution of Oceanography, SAIC, and the Environmental and Sustainability Initiative at University of California, San Diego, and was published by the San Diego Foundation. Focus 2050 explored what the San Diego Region may look like in 2050 if current climate trends continue. Potential impacts were forecasted by scientists at the Scripps Institute of Oceanography using three Intergovernmental Panel on Climate Change (IPCC) climate models and two emissions scenarios.

The models predicted warming in San Diego County of between 1.5°F and 4.5°F by 2050. Rising temperatures, along with a growing population, will likely create a variety of challenges for the San Diego Region. For example, Focus 2050 determined that heat waves are likely to increase in frequency, magnitude, and duration, thereby increasing energy demand and bringing about public health threats in the process. Extended drought conditions were forecasted to lead to longer fire seasons and an increased likelihood of large wildfires. The study indicated that warmer temperatures also increase the formation of ground level ozone and may heighten exposure levels to vector born diseases, such as West Nile Virus.

Focus 2050 also examined how climate change will impact water supply and water quality. The study found that shortfalls in water supply will likely occur as warmer temperatures cause significant declines in Colorado River flow and Sierra Nevada snowpack, the region's two main sources of imported water. Additionally, sea level rise along with an increased incidence of extreme high sea level events will lead to coastal erosion and will damage critical habitat, real estate, and infrastructure. These projected impacts will also put additional stress on the region's threatened and vulnerable ecosystems.

In response to the climate change threat, many communities in the United States are taking responsibility for addressing climate change at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries. Through proactive measures around sustainable land use patterns, transportation demand management, energy efficiency, green building, and waste diversion, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts. As the effects of climate change become more common and severe, local government adaptation policies will be fundamental in preserving the welfare of residents and businesses.

1.2 Purpose of Inventory

The objective of this greenhouse gas emissions inventory is to identify the sources and quantities of greenhouse gas emissions resulting in Vista during 2005. This inventory is a necessary first step in addressing greenhouse gas emissions, serving two purposes:

- It creates an emissions baseline against which Vista can set emissions reductions targets and measure future progress.
- It allows local governments to understand the scale of emissions from various sources.

While Vista has already begun to reduce greenhouse gas emissions through its actions, this inventory represents the first step in a systems approach to reducing the City's emissions. This system, developed by ICLEI is called the Five Milestones for Climate Mitigation. This Five-Milestone process involves the following steps:

Milestone One: Conduct a baseline emissions inventory and forecast

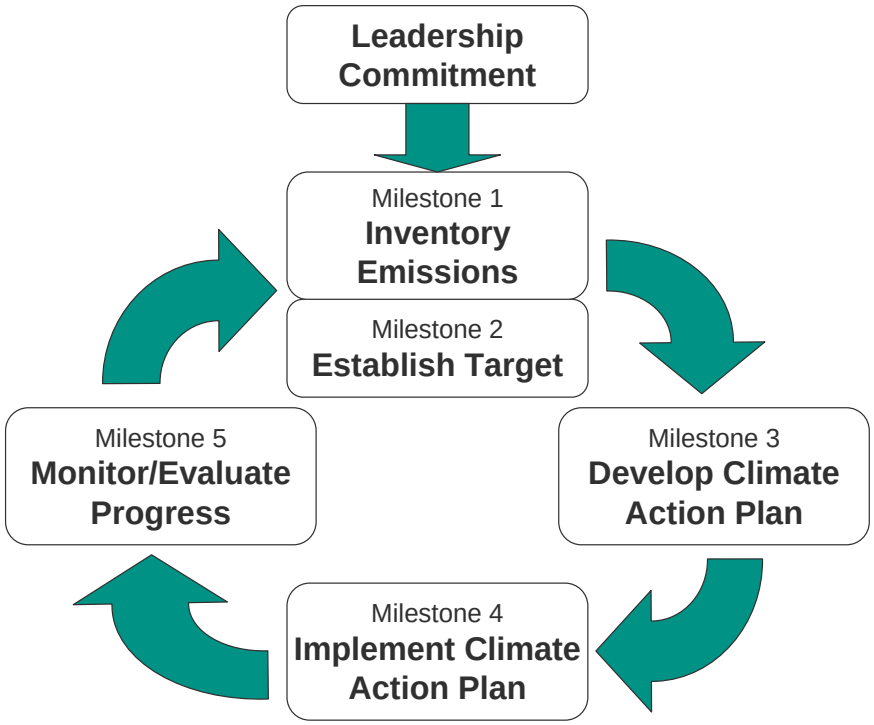
Milestone Two: Adopt an emissions reduction target for the forecast year

Milestone Three: Develop a local climate action plan

Milestone Four: Implement the climate action plan

Milestone Five: Monitor progress and report results

Figure 1.1: The Five-Milestone Process



1.3 Climate Change Mitigation Activities in California

Since 2005, the State of California has responded to growing concerns over the effects of climate change by adopting a comprehensive approach to addressing emissions in the public and private sectors. This approach was officially initiated with the passage of the Global Warming Solutions Act of 2006 (AB 32), which requires the state to reduce its greenhouse gas emissions to 1990 levels by 2020. It also requires the California Air Resources Board (ARB) to develop a policy plan for reaching AB 32 emissions reduction goals and to adopt and enforce regulations to implement the plan.

The resulting AB 32 Scoping Plan was adopted by ARB in December 2008. Among many other strategies, it encourages local governments to reduce emissions in their jurisdictions by a degree commensurate with state goals, approximately 15 percent below current levels. In addition, it identifies the following strategies that will impact local governance:

- Develop a California cap-and-trade program
- Expand energy efficiency programs
- Establish and seek to achieve reduction targets for transportation-related GHG emissions
- Expand the use of green building practices
- Increase waste diversion, composting, and commercial recycling toward zero-waste
- Continue water efficiency programs and use cleaner energy sources to move and treat water
- Reduce methane emissions at landfills
- Preserve forests that sequester carbon dioxide

Other measures taken by the state include mandating stronger vehicle emissions standards (AB 1493, 2002), establishing a low-carbon fuel standard (EO # S-01-07, 2007), mandating a climate adaptation plan for the state (S-EO # 13-08, 2008), establishing a Green Collar Job Council, and establishing a renewable energy portfolio standard for power generation or purchase in the state. The state also has made a number of legislative and regulatory changes that have significant implications for local governments:

- SB 97 (2007) requires the Office of Planning and Research to create greenhouse gas planning guidelines for the California Environmental Quality Act (CEQA). In addition, ARB is tasked with creating energy-use and transportation thresholds in CEQA reviews, which may require local governments to account for greenhouse gas emissions when reviewing project applications.
- AB 811 (2007) authorizes all local governments in California to establish special districts that can be used to finance solar or other renewable energy improvements to homes and businesses in their jurisdiction.

- SB 375 (2008) revises the process of regional transportation planning by metropolitan planning organizations (MPOs), which are governed by elected officials from local jurisdictions. The statute calls on ARB to establish regional transportation-related greenhouse gas targets and requires the MPO to develop a regional "Sustainable Communities Strategy" of land use, housing and transportation policies that will move the region towards its GHG target. The statute stipulates that transportation investments must be consistent with the Sustainable Communities Strategy and provides CEQA streamlining for local development projects that are consistent with the Strategy.

1.4 The San Diego Regional Climate Protection Initiative

The San Diego Regional Climate Protection Initiative is a joint effort between The San Diego Foundation, ICLEI, and 10 local governments in San Diego County. The Initiative was established in 2009 to provide a regional platform for local governments to follow ICLEI's Five-Milestone process (described in Section 1.2).

Through generous support from the San Diego Foundation, ICLEI is working directly with local governments in the San Diego region to quantify greenhouse gas emissions and drive regional activity to reduce emissions and enhance resiliency to a changing climate. In addition to performing greenhouse gas inventories for each local jurisdiction, ICLEI is providing ongoing training and technical assistance to participating agencies. The Initiative also includes the initiation and facilitation of a formal regional network of local governments and key stakeholders focused on climate protection initiatives, including both mitigation and adaptation activities. The Network mirrors similar networks across the country that ICLEI supports to engage local governments in information and resource exchange, best practices and lessons learned, as well as collaboration opportunities.

Section Two: Methodology

Methodology

The inventories in this report follow two standards, one for government operations emissions and one for community emissions. As local governments all over the world continue to join the climate protection movement, the need for common conventions and a standardized approach to quantifying greenhouse gas (GHG) emissions is more pressing than ever.

The government operations component of the greenhouse gas emissions inventory follows the standard methodology outlined in the Local Government Operations Protocol (LGOP), which was adopted in 2008 by ARB and serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. By participating in the San Diego Regional Climate Protection Initiative, the City of Vista has the opportunity to be one of the first in the nation to follow LGOP when inventorying emissions from government operations.

The community emissions inventory follows the standard outlined in the draft International Local Government GHG Emissions Analysis Protocol (IEAP). ICLEI has been developing this guidance since the inception of its Cities for Climate Protection Campaign in 1993, and has recently formalized version 1 of the IEAP as a means to set a common framework for all local government worldwide. The community inventory also draws on the methodology developed in the *San Diego County Greenhouse Gas Inventory* developed by the Energy Policy Initiatives Center (EPIC) at the University of San Diego in September 2008.

This chapter outlines the basic methodology utilized in the development of this inventory to provide clarity on how the inventory results were reported. Specifically, this section reviews:

- What greenhouse gases were measured in this inventory.
- What general methods were used to estimate emissions.
- How emissions estimates can be reported (the scopes framework, roll-up numbers).
- How emissions estimates were reported in this inventory.

A more detailed account of the methodology used in this inventory can be found in Appendices A and B.

2.1 Greenhouse Gases

According to both the LGOP and the IEAP, local governments should assess emissions of all six internationally recognized greenhouse gases regulated under the Kyoto Protocol. These gases are outlined in Table 2.1, which includes the sources of these gases and their global warming potential (GWP).[4] This report focuses on the four GHGs most relevant to local government policymaking: CO_2, CH_4, N_2O, and hydrofluorocarbons. These gases comprise a large majority of greenhouse gas emissions at the community level, and are the only gases emitted in Vista's government operations. The omitted gases, SF_6 and perfluorocarbons, are emitted primarily in private sector manufacturing and electricity transmission, and are the subject of regulation at the state level.

Table 2.1: Greenhouse Gases

Gas	Chemical Formula	Activity	Global Warming Potential (CO_2e)
Carbon Dioxide	CO_2	Combustion	1
Methane	CH_4	Combustion, Anaerobic Decomposition of Organic Waste (Landfills, Wastewater), Fuel Handling	21
Nitrous Oxide	N_2O	Combustion, Wastewater Treatment	310
Hydrofluorocarbons	Various	Leaked Refrigerants, Fire Suppressants	12–11,700
Perfluorocarbons	Various	Aluminum Production, Semiconductor Manufacturing, HVAC Equipment Manufacturing	6,500–9,200
Sulfur Hexafluoride	SF_6	Transmission and Distribution of Power	23,900

2.2 Calculating Emissions

The majority of the emissions recorded in this inventory have been calculated using **calculation-based methodologies** to derive emissions using activity data and emission factors. To estimate emissions accordingly, the basic equation below is used:

Activity Data x Emission Factor = Emissions

Activity Data

Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see the appendices for detailed listing of the activity data used in composing this inventory.

4 Global warming potential (GWP) is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide.

Emission Factors

Emission factors are used to convert energy usage or other activity data into associated emissions quantities. They are usually expressed in terms of emissions per unit of activity data (e.g. lbs CO_2/kWh). Please see Appendix B for a listing of emissions factors used in this report. Table 2.2 demonstrates an example of common emission calculations that use this formula.

Table 2.2: Basic Emissions Calculations

Activity Data	Emissions Factor	Emissions
Electricity Consumption (kilowatt hours)	CO_2 emitted/kWh	CO_2 emitted
Natural Gas Consumption (therms)	CO_2 emitted/therm	CO_2 emitted
Gasoline/Diesel Consumption (gallons)	CO_2 emitted /gallon	CO_2 emitted
Waste Generated by Government Operations (tons)	CH_4 emitted/ton of waste	CH_4 emitted

2.3 Reporting Emissions

This section defines the two reporting frameworks—scopes and sectors—and discusses how they are used in this inventory. It also discusses the concept of "rolling up" emissions into a single number. The section provides guidance on communicating the results of the inventory and using the inventory to formulate emissions reductions policies.

2.3.1 The Scopes Framework

For government operations and community inventories, emissions sources can be categorized by "scope" according to the entity's degree of control over the emissions source and the location of the source. Emissions sources are categorized as direct (Scope 1) or indirect (Scope 2 or Scope 3), in accordance with the World Resources Institute and the World Business Council for Sustainable Development's *Greenhouse Gas Protocol Corporate Standard.* The standard is to report emissions by scope as a primary reporting framework.[5]

Community Scope Definitions

The scopes framework includes three emissions scopes for community emissions:

Scope 1: All direct emissions from sources located within the jurisdictional boundaries of the local government, including fuel combusted in the community and direct emissions from landfills in the community.

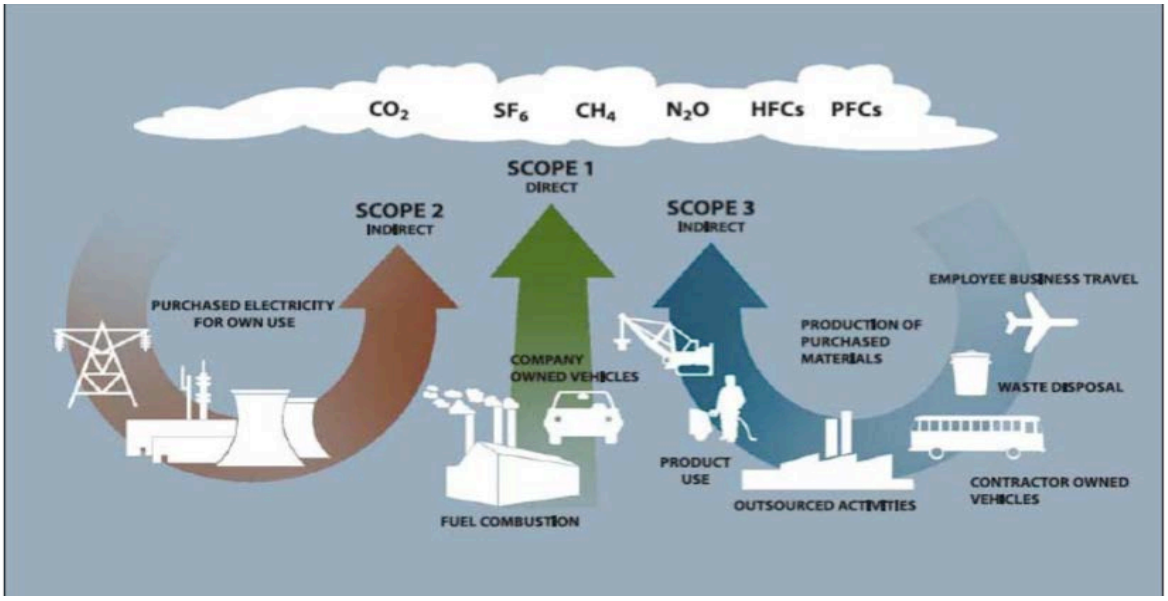
Scope 2: Indirect emissions associated with the consumption of energy that is generated outside the jurisdictional boundaries of the local government.

5 Another common reporting framework is emissions by sector: See Section 2.1.6-Emisisons Sectors for details

Scope 3: All other indirect or embodied emissions not covered in Scope 2, that occur as a result of activity within the jurisdictional boundaries.

Scope 1 and Scope 2 sources are the most essential components of a community greenhouse gas analysis. This is because these sources are typically the most significant in scale, and are most easily impacted by local policy making. The IEAP also includes, in its *Global Reporting Standard*, the reporting of Scope 3 emissions associated with the future decomposition of solid waste generated in the community in the base year.

Figure 2.1: Emissions Scopes



Source: WRI/WBCSD GHG Protocol Corporate Accounting and Reporting Standard (Revised Edition), Chapter 4.

Government Scope Definitions

Similar to the community framework, the government scopes are divided into three main categories:

Scope 1: Direct emissions from sources within a local government's operations that it owns and/or controls. This includes stationary combustion to produce electricity, steam, heat, and power equipment; mobile combustion of fuels; process emissions from physical or chemical processing; fugitive emissions that result from production, processing, transmission, storage and use of fuels; leaked refrigerants; and other sources.

Scope 2: Indirect emissions associated with the consumption of electricity, steam, heating, or cooling that are purchased from an outside utility.

Scope 3: All other emissions sources that hold policy relevance to the local government that can be measured and reported. This includes all indirect emissions not covered in Scope 2 that occur as a result of activities within the operations of the local government. Scope 3 emission sources include (but are not limited to) tailpipe emissions

from employee commutes, employee business travel, and emissions resulting from the decomposition of government-generated solid waste.

2.3.2 Double Counting and Rolling Up Scopes

Many local governments find it useful for public awareness and policymaking to use a single number (a "roll-up" number) to represent emissions in its reports, target setting, and action plan. A roll-up number allows local governments to determine the relative proportions of emissions from various sectors (e.g., 30 percent of rolled up emissions came from the vehicle fleet), which can help policymakers and staff identify priority actions for reducing emissions from their operations.

For these reasons, this report includes roll-up numbers as the basis of the both the government operations and community emissions analyses in this inventory. This roll-up number is composed of direct emissions (Scope 1), all emissions from purchased electricity (Scope 2), and other indirect emissions (Scope 3).

While this report uses a standard roll-up number, these numbers should be used with caution, as they can be problematic for three reasons:

First, a roll-up number does not represent all emissions from Vista's operations, only a summation of inventoried emissions using available estimation methods. Reporting a roll-up number can be misleading and encourage citizens, staff, and policymakers to think of this number as the local government's "total" emissions. Therefore, when communicating a roll-up number it is important to represent it only as a sum of inventoried emissions, not as a comprehensive total.

Second, rolling up emissions may not simply involve adding emissions from all sectors, as emissions from different scopes can be double-counted when they are reported as one number. For example, if a local government operates a municipal utility that provides electricity to government facilities, these are emissions from both the power generation and facilities sectors. If these sectors are rolled up into a single number, these emissions are double counted, or reported twice. For these reasons, it is important to be cautious when creating a roll-up number to avoid double counting; the roll-up number used in this report was created specifically to avoid any possible double counting.

Third, it is very difficult to use a roll-up number as a common measure between local governments, which is how the results are sometimes applied. Currently, there is no national or international standard for reporting emissions as a single roll-up number. In addition, local governments provide different services to their citizens, and the scale of the services (and thus the emissions) is highly dependent upon the size of the jurisdiction. For these reasons, comparisons between local government roll-up numbers should not be made without significant analysis of the basis of the roll-up number and the services provided by the local governments being compared.

Furthermore, the results from the government operations component and community component of the inventory should not be rolled-up into one number, as government operations emissions are already accounted for as one source among many in the community inventory.

2.3.3 Emissions Sectors

In addition to categorizing emissions by scope, ICLEI recommends that local governments examine their emissions in the context of the sector that is responsible for those emissions. Many local governments will find a sector-based analysis more directly relevant to policy making and project management, as it assists in formulating sector-specific reduction measures and climate action plan components. The government operations inventory uses LGOP sectors as a primary reporting framework, including the following sectors:

- Buildings and other facilities
- Streetlights, traffic signals, and other public lighting
- Water delivery facilities
- Vehicle fleet and mobile equipment
- Government-generated solid waste
- Emissions from employee commutes

The community inventory reports emissions by the following sectors:

- Residential. This sector includes Scope 1 natural gas combustion and Scope 2 electricity consumption.
- Commercial/Industrial. This sector includes Scope 1 fuel combustion and Scope 2 electricity consumption.
- Transportation. This sector includes exclusively Scope 1 transportation fuel combustion.
- Solid Waste. This sector includes Scope 1 emissions from landfills located in the jurisdiction and Scope 3 emissions from future decomposition of solid waste generated in the community in the base year.
- Wastewater. This sector includes Scope 3 emissions from wastewater generated in the community in the base year.

Section Three: Government Operations Inventory Results

Government Operations Inventory Results

This chapter provides a detailed description of Vista's greenhouse gas emissions from government operations in 2005, rolling up and comparing emissions across sectors and sources as appropriate. This chapter also provides details on emissions from each sector, including a breakdown of emissions types and, where possible, an analysis of emissions by department. This information identifies more specific sources of emissions (such as a particular building) that can help staff and policymakers in the City to best target emissions reduction activities in the future.

For a report of emissions by scope, and a detailed description of the methodology and emission factors used in calculating the emissions from Vista's operations, please see Appendix B: LGOP Standard Report.

In 2005, the City of Vista's government operations greenhouse gas emissions totaled 3,865 metric tons of CO_2e.[6] In this report, this number is the basis for comparing emissions across sectors and sources (fuel types), and is the aggregate of all emissions estimates used in this inventory.

3.1 Summary by Sector

Reporting emissions by sector provides a useful way to understand the sources of Vista's emissions. By better understanding the relative scale of emissions from each of the sectors, Vista can more effectively focus emissions reductions strategies to achieve the greatest emissions reductions.[7]

6 This number represents a roll-up of emissions, and is not intended to represent a complete picture of emissions from Vista's operations. This roll-up number should not be used for comparison with other local government roll-up numbers without a detailed analysis of the basis for this total. See section 2.3.2 for more detail.

7 The sectors with the largest scale of emissions do not necessarily represent the best opportunity for emissions reductions. Cost, administration, and other concerns may affect Vista's ability to reduce emissions from any one sector.

Figure 3.1: 2005 Vista Government Operations Emissions by Sector

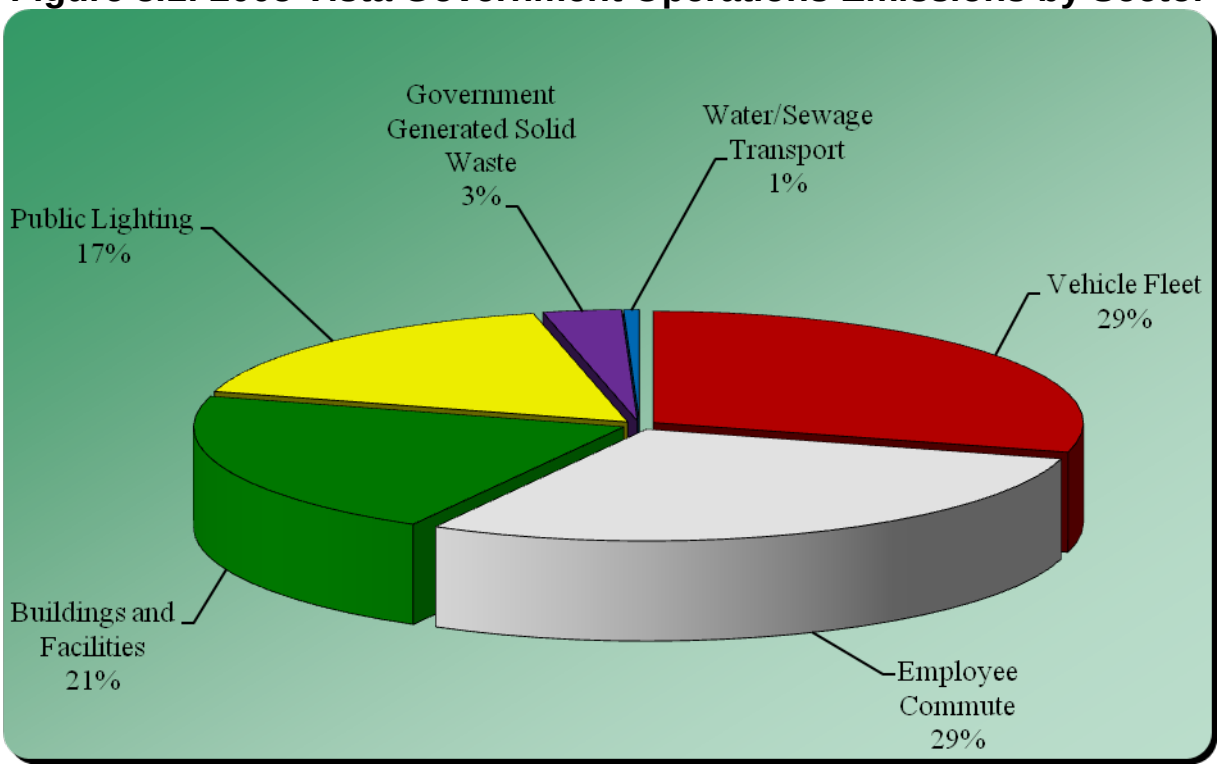


Table 3.1: 2005 Vista Government Operations Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Vehicle Fleet	1,132
Employee Commute	1,114
Buildings and Facilities	823
Public Lighting	659
Government Generated Solid Waste	114
Water/Sewage Transport	23
TOTAL	**3,865**

As shown in Figure 3.1, the City's vehicle fleet was the largest emitter (1,132 metric tons CO_2e) in 2005. Emissions from employee commutes produced the second highest quantity of emissions, resulting in 1,114 metric tons of CO_2e. The City's buildings and facilities produced 823 metric tons of CO_2e of total emissions with the remainder coming from public lighting, government generated solid waste, and water and sewage transport.

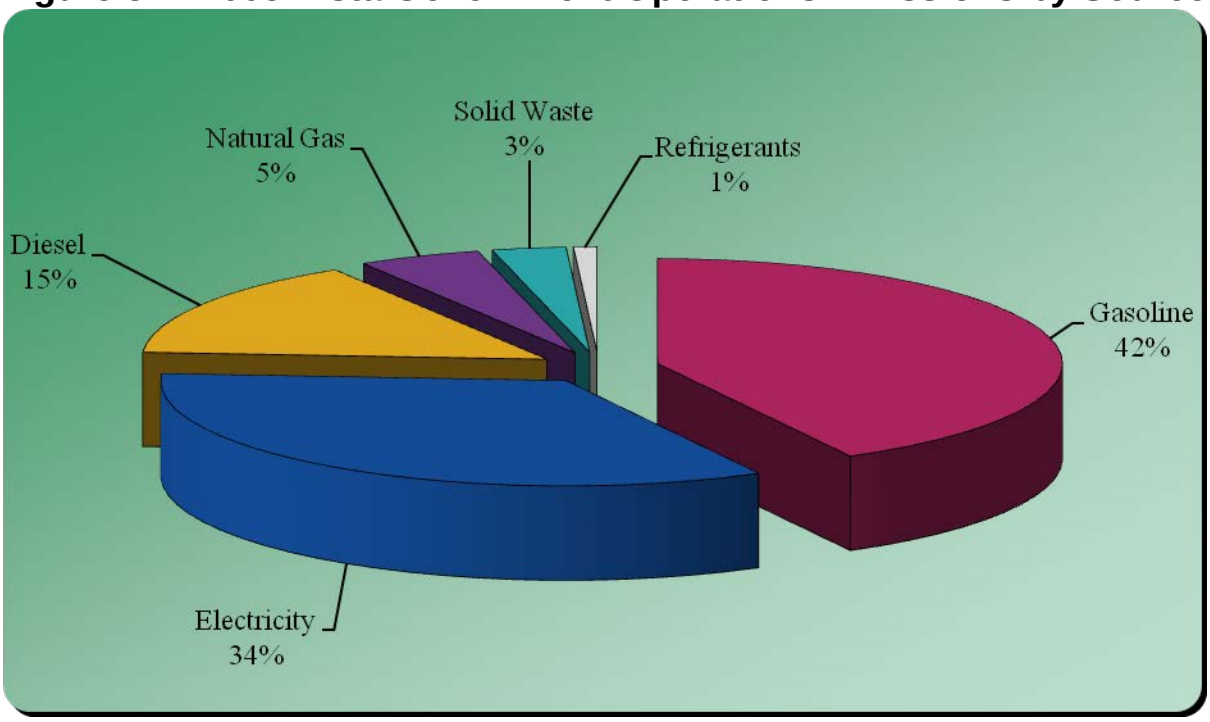
3.2 Summary by Source

When considering how to reduce emissions, it is helpful to look not only at which sectors are generating emissions, but also at the specific raw resources and materials (gasoline, diesel, electricity, natural gas, solid waste, etc.) whose use and generation directly result in the release of greenhouse gases. This analysis can help target resource management in a way that will successfully reduce greenhouse gas emissions. Table 3.2 and Figure 3.2 provide a summary of Vista's government operations 2005 greenhouse gas emissions by fuel type or material.

Table 3.2: 2005 Vista Government Operations Emissions by Source

Fuel/Source	Greenhouse Gas Emissions (metric tons CO_2e)
Gasoline	1,628
Electricity	1,312
Diesel	586
Natural Gas	189
Government-Generated Solid Waste	114
Refrigerants	36

Figure 3.2: 2005 Vista Government Operations Emissions by Source



3.3 Summary of Energy-Related Costs

In addition to tracking energy consumption and generating estimates on emissions per sector, ICLEI has calculated the basic energy costs of various government operations. The City of Vista spent approximately $1,187,328 on energy (e.g., electricity, natural gas, gasoline, and diesel) for its operations.[8] Seventy eight percent of these energy expenses ($927,731) are the result of electricity and natural gas purchases from SDG&E. Vista spent approximately $259,597 on gasoline and diesel for the municipal fleet (22 percent of total costs). Beyond reducing harmful greenhouse gases, any future reductions in energy use will have the potential to reduce these costs, enabling Vista to reallocate limited funds toward other municipal services or create a revolving energy loan fund to support future climate protection activities.

Table 3.3: Vista Energy Costs by Sector

Activity	Costs ($)
Buildings and Facilities	$588,089
Vehicle Fleet	$259,597
Public Lighting	$335,218
Water / Sewage	$4,424
Government-Generated Solid Waste	No Data
Total Assessed Costs	**$1,187,328**

3.4 Detailed Sector Analyses

3.4.1 Buildings and Other Facilities

The City of Vista operates more than twenty facilities, including the City Hall, fire stations, a senior center, a water park, a theater, and numerous parks and community centers. Facility operations contribute to greenhouse gas emissions in two major ways. First, facilities consume electricity and fuels such as natural gas and diesel, and this consumption contributes the majority of greenhouse gas emissions from facilities. In addition, fire suppression, air conditioning, and refrigeration equipment in buildings can emit hydrofluorocarbons (HFCs) and other greenhouse gases when these systems leak refrigerants or fire suppressants.

In 2005, the operation of Vista's facilities produced approximately 823 metric tons of CO_2e from the above sources. Table 3.4 and Figure 3.3 depict 2005 emissions per facility or department. Of total facility emissions, approximately 77 percent came from the consumption of electricity, 23 percent came from the combustion of natural gas, and the remaining emissions came from the combustion of diesel (see Figure 3.4). Vista spent over $588,000 on the fuels and electricity that were the cause of these emissions.

8 More-recent 2007 cost data were used as a proxy for 2005 SDG&E costs.

Table 3.4: Energy Use and Emissions from Major Facilities

Facility	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of All Facilities	Electricity Use (kWh)	Natural Gas Use (therms)
Wave Waterpark	237	29%	566,119	18,012
Parks & Recreation	160	20%	630,594	502
City Hall	139	17%	498,401	2,651
Fire Stations	110	13%	334,640	4,705
Senior Center	81	10%	189,893	6,380
Public Services Facility	53	6%	173,840	1,687
Avo Playhouse	20	2%	75,440	268
Rancho Buena Vista Adobe	11	1%	29,601	739
Chamber of Commerce	3	0.4%	11,131	119
Other	7	0.8%	14,667	550
TOTAL	**823**	**100%**	**2,524,326**	**35,613**

Figure 3.3: Emissions from Major Facilities

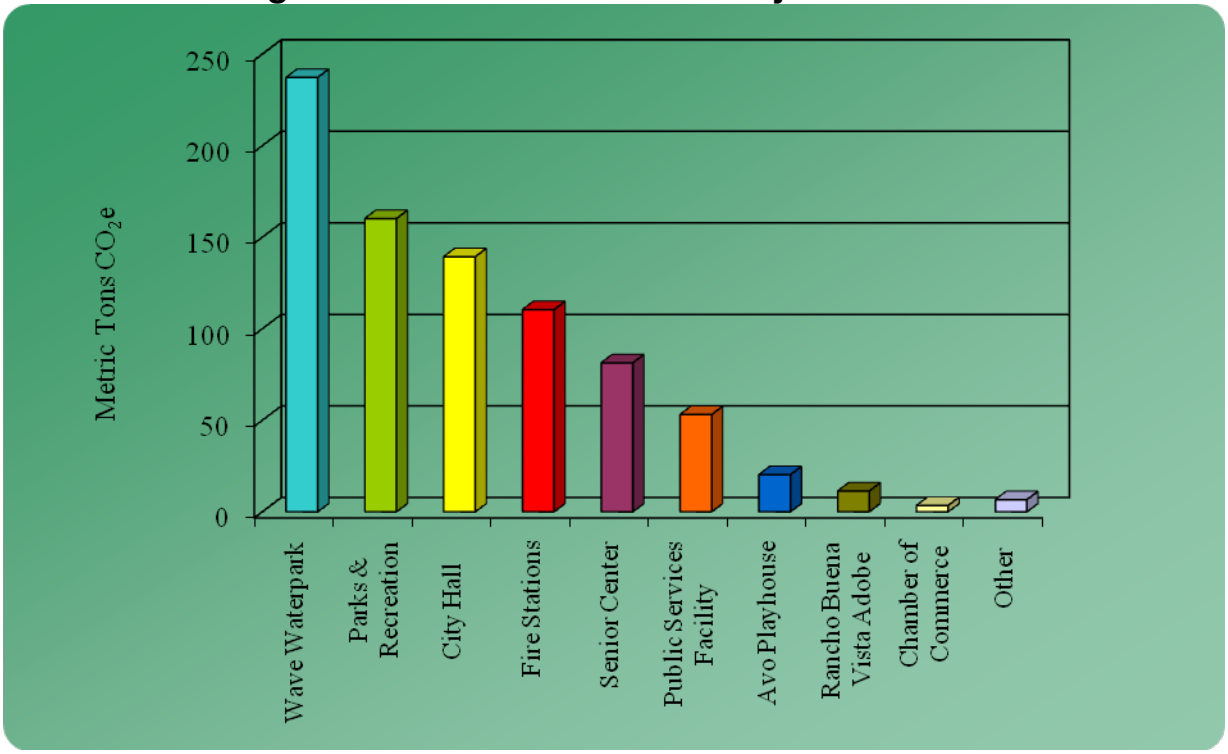
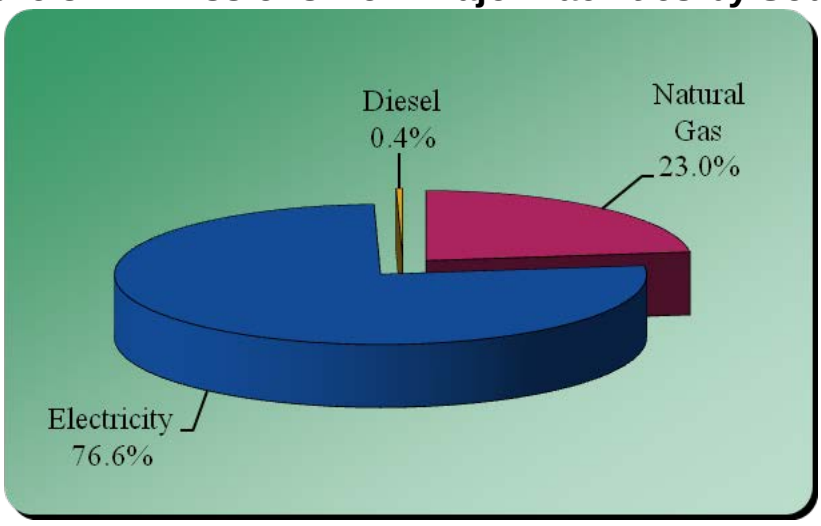


Figure 3.4: Emissions from Major Facilities by Source



3.4.2 Streetlights, Traffic Signals, and Other Public Lighting

Like most local governments, Vista operates a range of public lighting, from traffic signals and sidewalk lighting to outdoor and park lights. Electricity consumed in the operation of this infrastructure is a significant source of greenhouse gas emissions.

In 2005, public lighting in Vista consumed a total of 2,637,493 kilowatt hours of electricity, producing approximately 659 metric tons CO_2e. Table 3.5 depicts 2005 emissions per lighting type and estimated electricity consumption associated with the activities that generated these emissions. The City spent approximately $335,218 in 2005 on the fuels and electricity that were the cause of these emissions.[9]

Table 3.5: Energy Use and Emissions from Public Lighting

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of All Lighting	Electricity Use (kWh)
Streetlights	507	77%	2,031,792
Traffic Signals/Controllers	144	22%	577,752
Outdoor Lighting	7	1%	27,949
TOTAL	**659**	**100%**	**2,637,493**

3.4.3 Water Transport

This section addresses any equipment used for the distribution of water and management of wastewater. Typical systems included in this section are water pumps/lifts and sprinkler and other irrigation controls. Vista operates some water transport equipment, including sprinklers and irrigation systems and sewage pumps. The majority of water delivery to the City is handled by the Vista Irrigation District and is not included in this inventory. Electricity

9 These costs were determined using 2007 SDG&E cost data as a proxy for 2005.

consumption is the most significant source of greenhouse gas emissions from the operation of Vista's water transport equipment.

In 2005, the operation of the City's water transport equipment produced approximately 23 metric tons of CO_2e from the above sources. Table 3.6 depicts 2005 emissions per equipment type and shows estimated activities associated with the operation of this equipment. Vista spent approximately $4,424 in 2005 on the fuels and electricity that were the cause of these emissions.

Table 3.6: Energy Use and Emissions from Water Transport Equipment

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Percent Emissions of Water Transport Equipment	Electricity Use (kWh)
Wastewater Management	18	80%	72,920
Sprinklers/Irrigation	5	20%	18,139
TOTAL	**23**	**100%**	**91,059**

3.4.4 Vehicle Fleet and Mobile Equipment

The majority of local governments use vehicles and other mobile equipment as an integral part of their daily operations—from maintenance trucks used for parks and recreation to police cruisers and fire trucks. These vehicles and equipment burn gasoline, diesel, and other fuels, which results in greenhouse gas emissions. In addition, vehicles with air conditioning or refrigeration equipment use refrigerants that can leak from the vehicle. Emissions from vehicles and mobile equipment compose a significant portion of emissions within most local governments.

Table 3.7: Vehicle Fleet and Mobile Equipment Emissions[10]

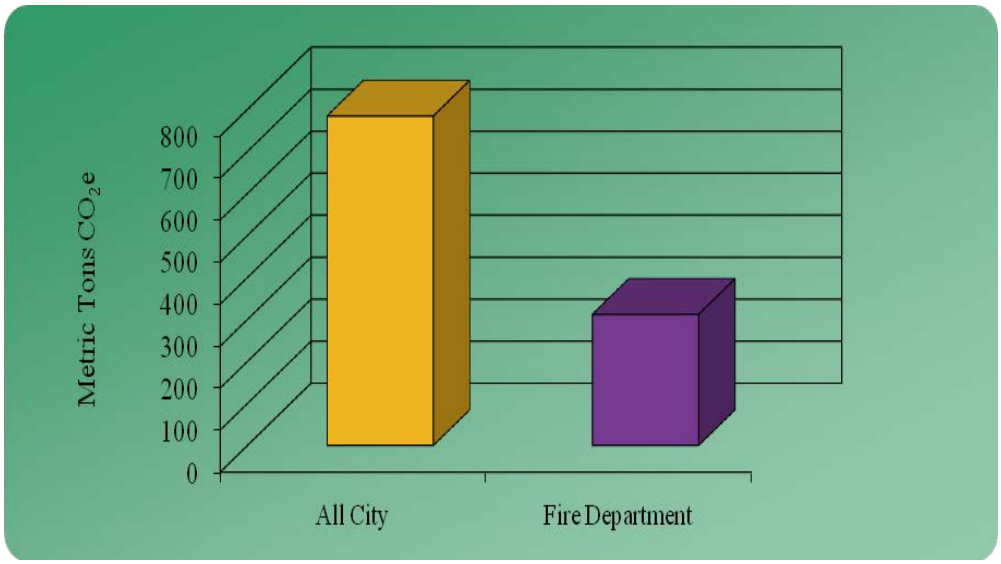
Function	Greenhouse Gas Emissions (metric tons CO_2e)	Percent of All Mobile Emissions	Gasoline Consumption (gal)	Diesel Consumption (gal)	Cost
All City	784	72%	57,591	26,031	$177,984
Fire Department	312	28%	7,478	24,081	$81,613
TOTAL	**1,096**	**100%**	**65,069**	**50,112**	**$259,597**

In 2005, Vista operated a vehicle fleet with 140 City vehicles, 25 fire fleet vehicles, and 76 pieces of equipment. Vista's vehicle fleet performed a number of essential services, from park, street and sewer maintenance to fire protection. The vehicle fleet emitted approximately 1,132 metric tons of CO_2e as a result of the combustion of fuels and leaked refrigerants. Table 3.7 and Figure 3.7 depict 2005 emissions of the combined city fleet and the fire department. Of all mobile emissions calculated, 52 percent came from the combustion of gasoline, 45 percent came from diesel, and the remaining 3 percent came from leaked mobile refrigerants. Leaked refrigerants from the City's

10 The numbers reported here include emissions from fuel consumption only-emissions from leaked refrigerants are reported separately.

vehicle fleet contributed 36 tons of CO_2e (about 1 percent of total emissions)[11]. The City of Vista spent approximately $259,597 in 2005 on the fuels that were the cause of these emissions.

Figure 3.7: Emissions from Mobile Sources



3.4.5 Government-Generated Solid Waste

Many local government operations generate solid waste, much of which is eventually sent to a landfill. Typical sources of waste in local government operations include paper and food waste from offices and facilities, construction waste from public works, and plant debris from parks departments. Organic materials in government-generated solid waste (including paper, food scraps, plant debris, textiles, wood waste, etc.) generate methane as they decay in the anaerobic environment of a landfill. An estimated 75 percent of this methane is routinely captured via landfill gas collection systems;[12] however, a portion escapes into the atmosphere, contributing to the greenhouse effect. As such, estimating emissions from waste generated by government operations is an important component of a comprehensive emissions inventory.

Inventorying emissions from government-generated solid waste is considered optional by LGOP for two reasons. First, the emissions do not result at the point of waste generation (as with fuel combustion), but in a landfill located outside of Vista's jurisdictional boundaries. In addition, the emissions are not generated in the same year that the

11 The LGOP Alternative Method (Mobile Fugitive Emissions) was used to estimate emissions from leaked mobile refrigerants. These estimates were calculated using high end default refrigerant charge capacities and thus represent a significant overestimate of emissions from this source.

12 This is a default methane collection rate per LGOP. This rate can vary from 0 to 99 percent based upon the presence and extent of a landfill gas collection system at the landfill/s where the waste is disposed. Most commonly, captured methane gas is flared into the atmosphere, which converts the methane gas to CO2 and effectively negates the human-caused global warming impact of the methane. Increasingly, landfill methane is being used to power gas-fired turbines as a carbon-neutral means of generating electricity.

waste is disposed, but over a lengthy decomposition period. Since inventorying these emissions is considered optional, LGOP does not provide guidance on recommended methods for quantifying these types of emissions. ICLEI therefore devised data collection and calculation methods based upon previous experience and national standards. See Appendix D for more information for more detail on quantifying emissions from government-generated solid waste.

It is estimated that the waste disposed by government facilities in 2009 will cumulatively produce 5.4 metric tons of methane gas, or 114 metric tons CO_2e. Please see Table 3.8 for a breakdown of emissions per department.

Table 3.8: Emissions from Government-Generated Solid Waste

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Estimated Landfilled Waste (Tons)
Parks & Recreation	76	299
Public Services	18	69
City Hall	13	52
Fire Stations	7	28
TOTAL	**114**	**448**

3.4.6 Employee Commute

Fuel combustion from employees commuting to work is another important emissions source from Vista's operations. Similar to the City's vehicle fleet, personal employee vehicles use gasoline and other fuels which, when burned, generate greenhouse gas emissions. Emissions from employee commutes are considered optional to inventory by LGOP because the vehicles are owned and operated privately by the employees. However, LGOP encourages reporting these emissions because local governments can influence how their employees commute to work through incentives and commuting programs. For this reason, employee commute emissions were included in this report as an area where Vista could achieve significant reductions in greenhouse gases.

To calculate emissions, Vista administered a survey to all of its employees regarding their commute patterns and preferences. ICLEI then extrapolated the results of the survey to represent emissions from all employees. See Appendix C for a detailed description of the survey and methods used to calculate emissions.

In 2009, employees commuting in vehicles to and from their jobs at the City of Vista emitted an estimated 1,114 metric tons of CO_2e. Table 3.9 shows estimated emissions and vehicle miles traveled for all Vista employees.

Table 3.9: Emissions from Employee Commutes

	Greenhouse Gas Emissions (metric tons CO_2e)	Estimated Vehicle Miles Traveled to Work	Average Estimated Vehicle Miles Traveled to Work
All Employees (Estimated)	1,114	2,175,205	5,592

3.4.6.1 Employee Commute Indicators

In addition to estimating greenhouse gas emissions from employee commutes, ICLEI examined other policy-relevant information that was extracted from the employee commute survey—in this way Vista staff can develop the most effective policies to reduce emissions from employee commutes. These measures often have co-benefits including increased productivity, reduced commute times and costs, and improvement in the quality of life for employees. No extrapolation was done with the following data; analyses were done using data from survey respondents only.

In 2009, the majority (88.7 percent) of respondents commuted to work by driving alone. Eleven percent of all respondents used some form of alternative transportation (bicycle, walking, carpool, etc) to commute to work with carpooling being the most used form of alternative transportation (5 percent of total respondents), followed by split modes (3.8 percent of total respondents) and biking (1.9 percent of total respondents). See Figure 3.6 for an analysis of the most common commute mode for employees who responded to the survey.

Figure 3.6: Employee Commute Modes

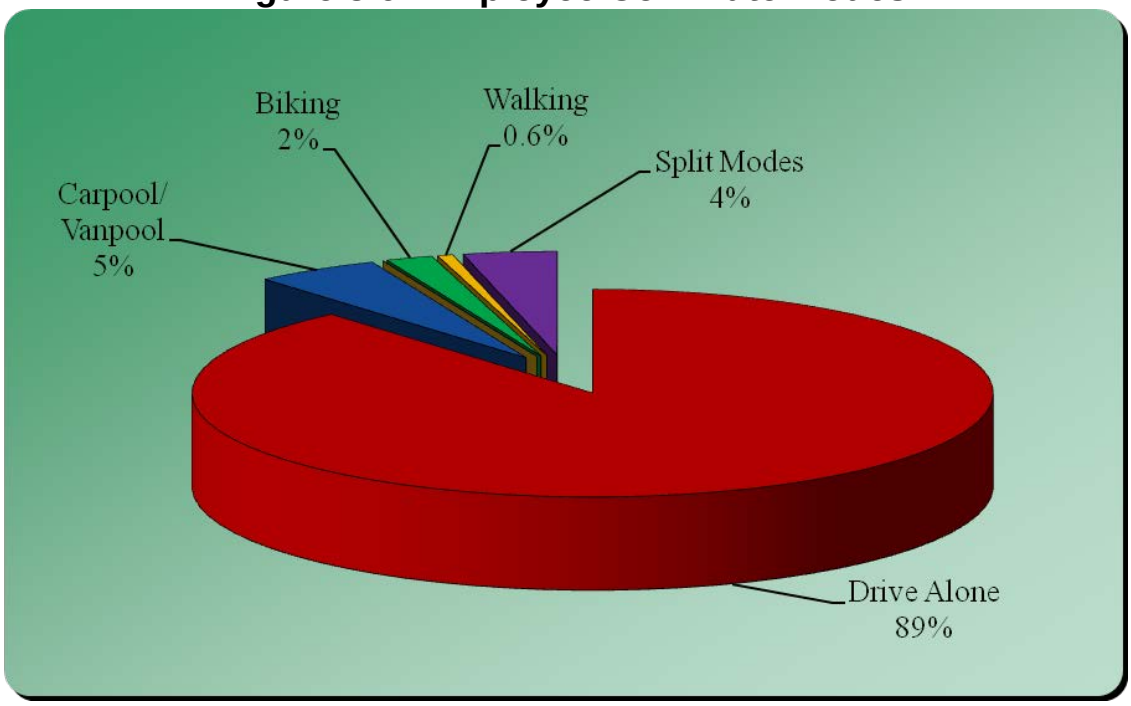


Table 3.10 shows the median time, cost, and distance of Vista's employees' commutes. In addition to reducing the City's greenhouse gas emissions, commuting alternatives may reduce commuting costs, time spent in traffic, and overall employee satisfaction.

Table 3.10: Distance and Time to Work and Cost of Employee Commutes

Median Time to Work (minutes)	Median Weekly Cost of Commute	Median Distance To Work (Miles)
15	$20	8

Section Four: Community Inventory Results

Community Inventory Results

4.1 Community Inventory Summary

In 2005, activities and operations taking place within Vista's jurisdictional boundaries resulted in approximately 547,039 metric tons of CO_2e. This number includes all Scope 1 emissions from the on-site combustion of fuels in the residential and commercial / industrial sectors, and from the combustion of gasoline and diesel in vehicles traveling on local roads and state highways within Vista. This number also includes all Scope 2 emissions associated with community electricity consumption, and Scope 3 emissions from waste and wastewater generated by the Vista community.[13]

4.1.1 Summary by Scope

As shown in Table 4.1, Scope 1 sources produced the largest amount of community greenhouse gas emissions in 2005, totaling 395,120 metric tons of CO_2e. Scope 2 emissions constituted the second largest amount (119,750 metric tons of CO_2e), and Scope 3 emissions totaled 31,052 metric tons of CO_2e.[14]

Table 4.1: Community Emissions Summary by Scope

Activity	CO_2e emitted	Scope Total
Scope 1		**396,237**
Transportation Fuels	314,097	
Natural Gas	78,533	
Landfill Waste-in-Place	3,607	
Scope 2		**119,750**
Purchased Electricity	119,750	
Scope 3		**31,052**
Community-Generated Solid Waste	26,703	
Wastewater	4,349	

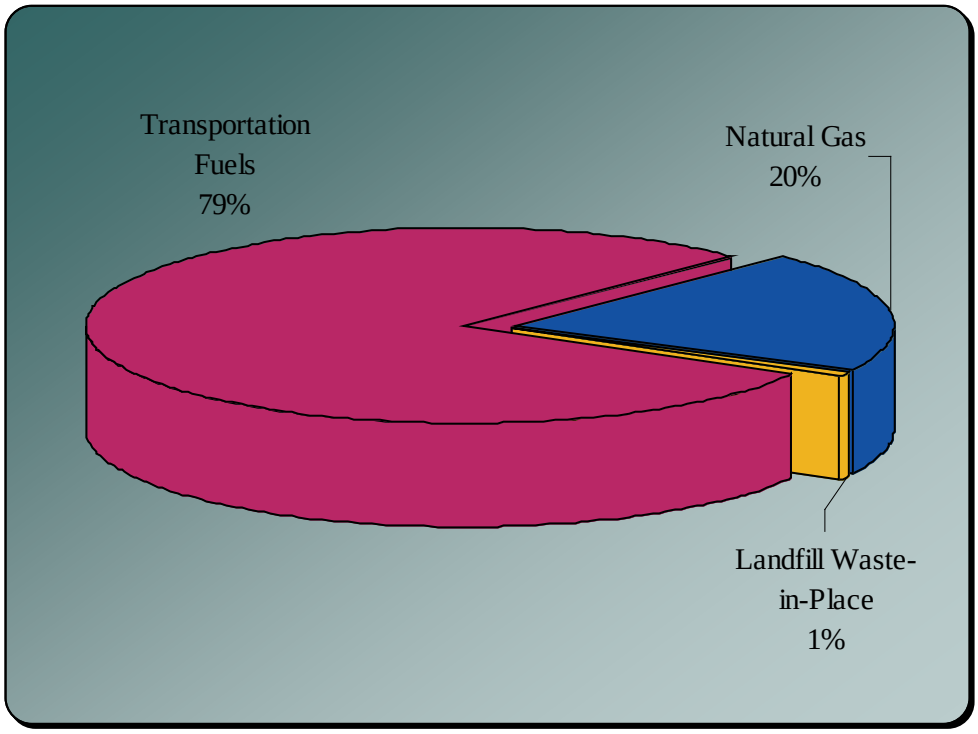
13 For a detailed description of scopes, please see Section 2: Methodology

14 These emissions have not been totaled as this may result in double counting and a percentage is not significantly relevant to forming emissions reduction policy. The summaries by sector and source have percentage breakdowns, as do individual sources of emissions.

Scope 1 Emissions

In 2005, Vista's community produced 396,237 metric tons CO_2e of Scope 1 greenhouse gas emissions. As seen in Figure 4.1, the largest percent (79 percent) of Scope 1 emissions resulted from mobile combustion of fuels. The second largest source of Scope 1 emissions was stationary combustion, constituting 20 percent of Scope 1 emissions.

Figure 4.1: Community Scope 1 Emissions



Scope 2 Emissions

In 2005, Vista's community generated 119,750 metric tons of CO_2e in the form of Scope 2 emissions from purchased electricity. All Scope 2 emissions in this inventory result from electricity consumed within Vista but produced out side the jurisdiction.

Scope 3 Emissions

In 2005, Vista's community generated 31,052 metric tons of CO_2e in the form of Scope 3 emissions. All Scope 3 sources included in this report are an estimate of methane and nitrous oxide emissions that will result from the anaerobic decomposition of solid waste and wastewater, generated by the Vista community during 2005.

4.1.2 Summary by Sector

By better understanding the relative scale of emissions from each primary sector, Vista can more effectively focus emissions reductions strategies to achieve the greatest emission reductions. For this reason, an analysis of emissions by sector is included in this report, based on the total of 547,039 metric tons of CO_2e. The five sectors included in this inventory are the following:

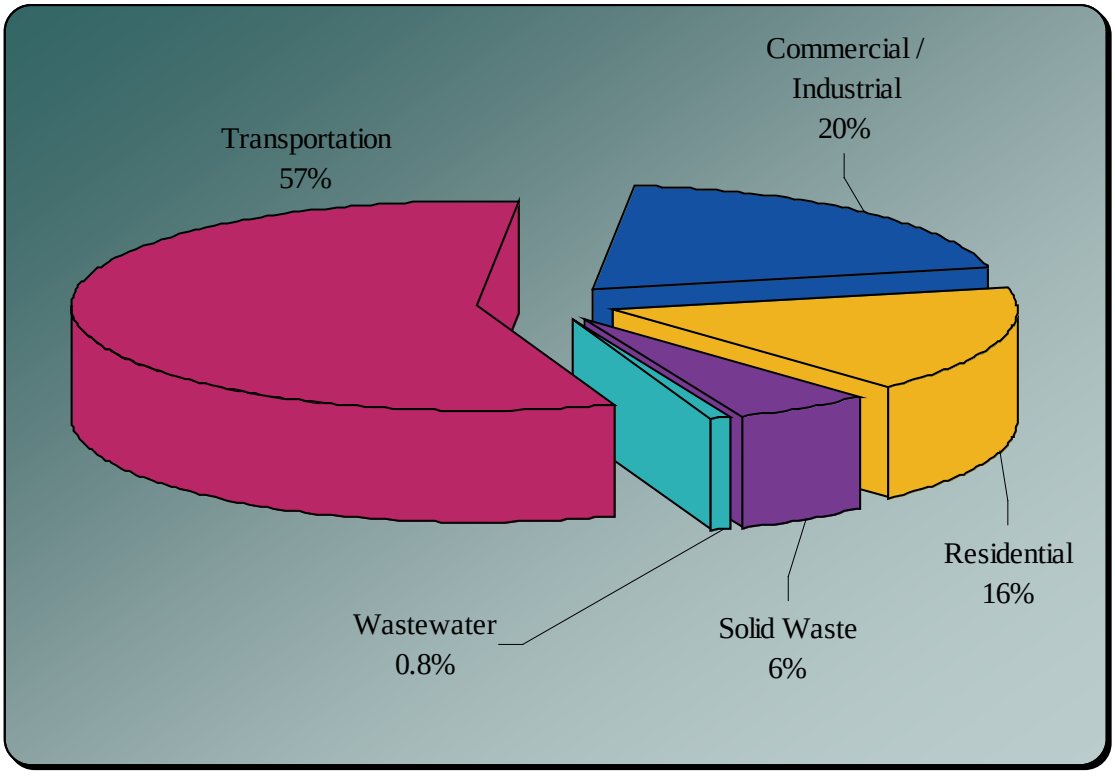
1. Residential
2. Commercial / Industrial
3. Transportation
4. Solid Waste
5. Wastewater

As visible in Figure 4.2, the transportation sector was the largest emitter (57 percent) in 2005 (314,097 metric tons of CO_2e). Emissions from the commercial / industrial sector produced the second highest quantity, resulting in 20 percent of total emissions, or 108,749 metric tons of CO_2e. The remainder of emissions came from the residential sector (16 percent), solid waste (6 percent), and wastewater (0.8 percent). Please see detailed sector emissions analyses below for more detail.

Table 4.2: Community Emissions Summary by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Transportation	314,097
Commercial / Industrial	108,749
Residential	89,534
Solid Waste	30,310
Wastewater	4,349
TOTAL	**547,039**

Figure 4.2: Community Emissions Summary by Sector



4.1.3 Summary by Source

When considering how to reduce emissions, it is also helpful to look not only at which sectors are generating emissions, but also at the specific raw resources and materials (gasoline, diesel, electricity, natural gas, solid waste, etc.) whose use and generation directly result in the release of greenhouse gases. Such analysis can help target resource management in a way that will successfully reduce greenhouse gas emissions. Below (Figure 4.3 and Table 4.3) is a summary of Vista's 2005 greenhouse gas emissions by fuel type or material, based upon the total community emissions of 547,039 metric tons.

Figure 4.3: Community Emissions Summary by Source

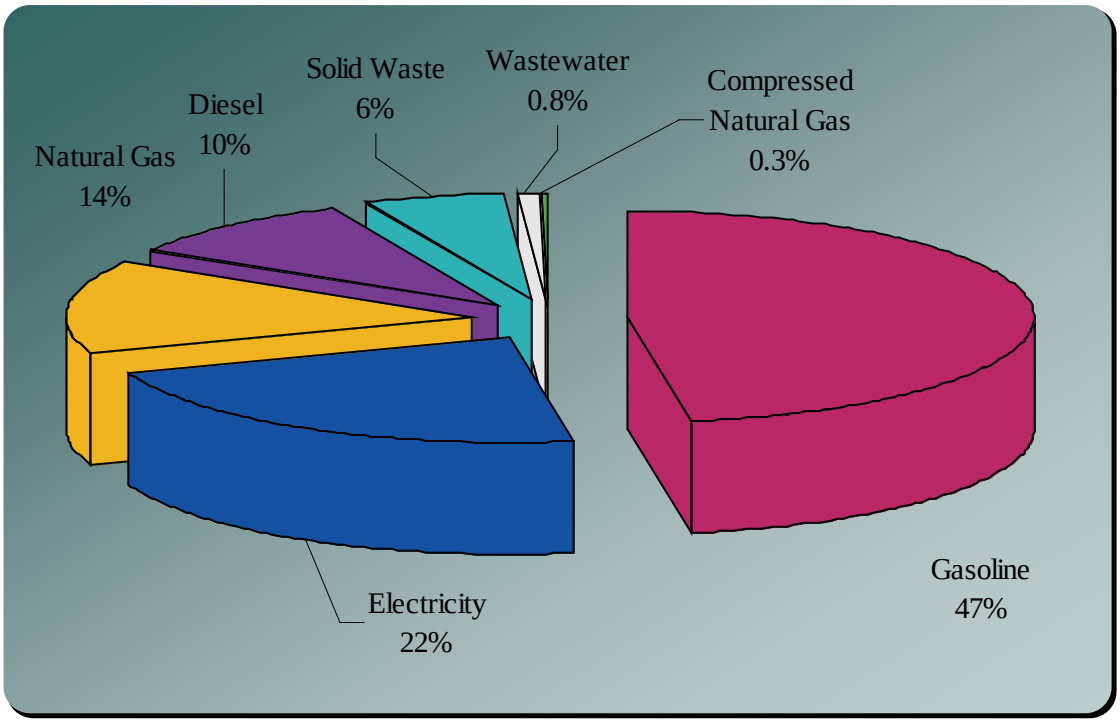


Table 4.3: Community Emissions Summary by Source

Source	Greenhouse Gas Emissions (metric tons CO_2e)
Gasoline	258,876
Electricity	119,750
Natural Gas	78,533
Diesel	52,579
Solid Waste	30,310
Wastewater	4,349
Compressed Natural Gas	1,525
TOTAL	**547,039**

4.1.4 Per Capita Emissions

Per capita emissions can be a useful metric for measuring progress in reducing greenhouse gases and for comparing one community's emissions with neighboring cities and against regional and national averages. That said, due to differences in emission inventory methods, it can be problematic to produce directly comparable per capita emissions numbers, and one must be cognizant of a margin of error when comparing figures between jurisdictions.

As detailed in Table 4.4, dividing the total community-wide GHG emissions by population yields a result of 5.8 metric tons of CO_2e *per capita*. It is important to note that this number is not the same as the carbon footprint of the

average individual living in Vista (which would include lifecycle emissions, emissions resulting from air travel, etc.).

Table 4.4: Per Capita Emissions

Estimated 2005 Population*	93,926
Community GHG Emissions (metric tons CO_2e)	547,039
Per Capita GHG Emissions (metric tons (CO_2e)	5.8

4.2 Community Inventory Detail by Sector

This section explores community activities and emissions by taking a detailed look at each primary sector. As listed above, the sectors included in the community emissions analysis are:

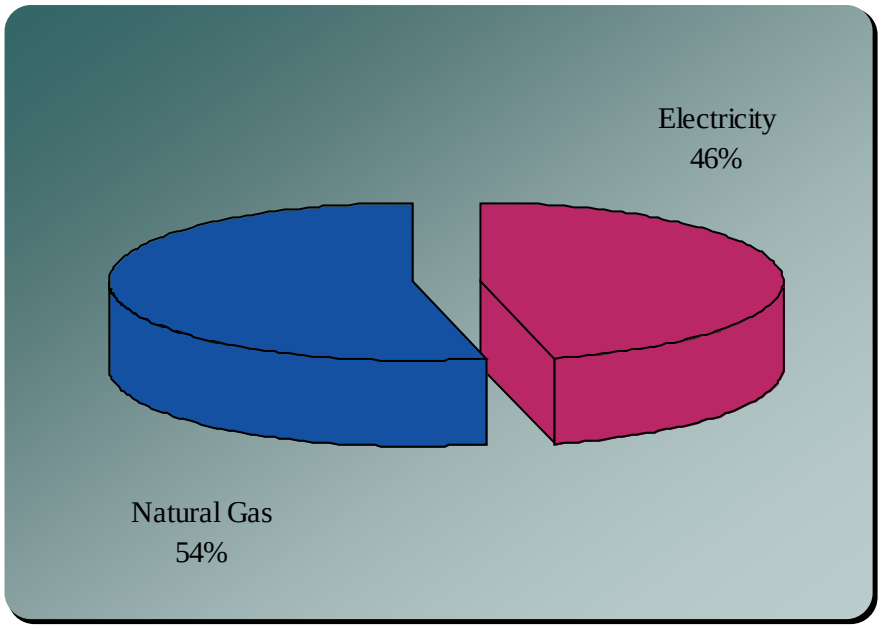
- Residential
- Commercial / Industrial
- Transportation
- Waste Generation
- Wastewater

4.2.1 Residential Sector

Energy consumption associated with Vista homes produced 89,534 metric tons of greenhouse gas emissions in 2005 (16 percent of total community emissions.) All residential sector emissions are the result of electricity consumption and the on-site combustion of natural gas. Emissions from lawn equipment, wood-fired stoves, transportation and waste generation are **not** included in these totals.

In 2005, Visa's entire residential sector consumed 165,464,999 kWh of electricity and 9,008,689 therms of natural gas. As shown in Figure 4.4, 54 percent of total Residential emissions (48,182 metric tons CO_2e) were the result of natural gas use, and 46 percent (41,352 metric tons CO_2e) were the result of electricity consumption. Natural gas is typically used in residences as a fuel for home heating, water heating and cooking, and electricity is generally used for lighting, heating, and to power appliances.

Figure 4.4: Residential Emissions by Source



4.2.2 Commercial / Industrial Sector

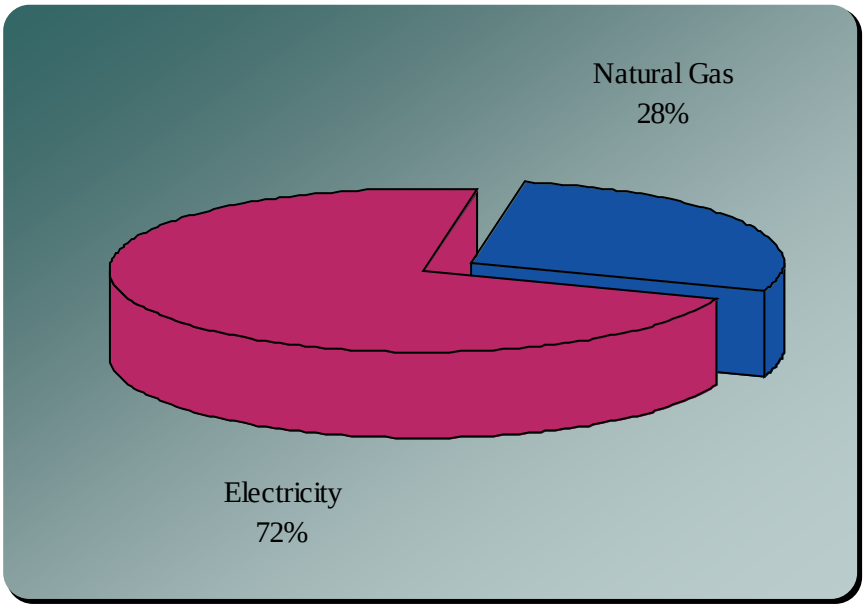
The commercial / industrial sector includes emissions from the operations of businesses as well as public agencies. For example, the majority of buildings and facilities included in the government operations inventory are also included as a subset of the commercial / industrial sector. In 2005, buildings and facilities within the commercial / industrial sector produced 108,749 metric tons of greenhouse gas emissions (20 percent of total community emissions). All commercial / industrial sector emissions included in this inventory are the result of electricity consumption and the on-site combustion of natural gas. It is important to note that emissions from off-road equipment, transportation, waste generation, stationary combustion other than natural gas, and other industrial processes are **not** included in these totals.

Vista businesses generated 3 metric tons of GHG emissions per job in 2005.[15] This metric provides an indication of the carbon intensity of economic activity in Vista.

In 2005, Visa's commercial/industrial sector consumed 298,464,632 kWh of electricity and 5,674,815 therms of natural gas. As shown in Figure 4.5, 28 percent of total commercial / industrial emissions (30,351 metric tons CO_2e) were the result of natural gas use, and 72 percent (78,398 metric tons CO_2e) were the result of electricity consumption. Natural gas is typically used in the commercial / industrial sector to heat buildings, fire boilers, and generate electricity; and electricity is generally used for lighting, heating, and to power appliances and equipment.

15 2005 jobs data was provided by SANDAG Technical Services Department, *Current Estimates*, August 2009.

Figure 4.5: Commercial / Industrial Emissions by Source



4.2.3 Transportation Sector

As with many other local governments, transportation within Vista's geographical boundary constitutes the greatest percentage (57 percent) of community wide greenhouse gas emissions -- 314,097 metric tons CO_2e.

As shown in Table 4.5, 91 percent of transportation sector emissions (285,449 metric tons CO_2e) came from on-road travel, with the remaining 9 percent (28,648 metric tons CO_2e) originating from off-road vehicle use. Of on-road transportation activity, travel on local city roads constituted 49 percent of emissions (153,014 metric tons CO_2e), and 42 percent (132,435 metric tons CO_2e) came from travel on state highways within jurisdictional boundary of Vista. An estimated 90 percent of on-road transportation emissions (256,904 metric tons CO_2e) were due to gasoline consumption with the remaining 10 percent (28,545 metric tons CO_2e) coming from diesel use.

Please see Appendix E for more detail on methods and emissions factors used in calculating emissions from the transportation sector.

Table 4.5: Transportation Emissions by Type

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Share of Total Transportation Emissions
On-Road Transportation		
Local Roads	153,014	49%
State Highways	132,435	42%
On-Road Subtotal	*285,449*	*91%*
Off-Road Transportation	28,648	9%
TOTAL	**314,097**	**100%**

4.2.4 Solid Waste Sector

As noted above in Figure 4.2, the waste sector constituted 6 percent of total emissions for the Vista community in 2005. Emissions from the waste sector are an estimate of methane generation from the decomposition of municipal solid waste (MSW) and alternative daily cover (ADC) sent to landfill in the base year (2005). These emissions are considered Scope 3 because they are not generated in the base year, but will result from the decomposition of 2005 waste over the full 100+ year cycle of its decomposition. As stated in the Government Inventory section, about 75 percent[16] of landfill methane emissions are captured through landfill gas collection systems, but the remaining 25 percent escape into the atmosphere as a significant contributor to global warming. This sector also includes emissions from the base year decomposition of waste-in-place at the Bonsall landfill. Please see Table 4.6 below for a summary of emissions per waste type.[17]

Table 4.6: Waste Emissions Sources

Source	Greenhouse Gas Emissions (metric tons CO_2e)	Share of Total Waste Emissions
Paper Products	14,000	46%
Food Waste	5,509	18%
Plant Debris	3,081	10%
Wood / Textiles	4,113	14%
Landfill Waste-in-Place	3,607	12%
TOTAL	**30,310**	**100%**

16 US EPA AP 42.
17 Waste characterization figures were provided by the 2004 *California Waste Characterization Study*, http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

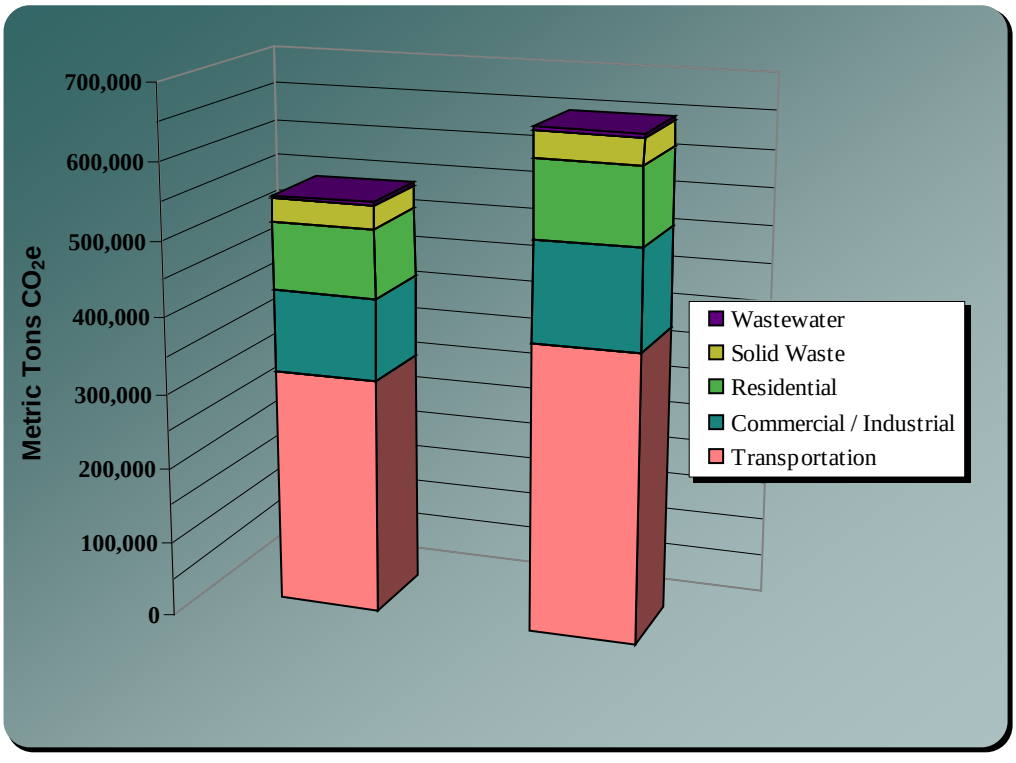
4.2.5 Wastewater Sector

The wastewater sector contributed 4,349 metric tons of greenhouse gas emissions, constituting 0.8 percent of total emissions for the Vista community in 2005. Emissions from the wastewater sector are an estimate of methane and nitrous oxide generated in the process of wastewater treatment. These emissions are considered Scope 3 because they occur at treatment facilities outside the jurisdictional boundaries and "downstream" from Vista's community where the wastewater is generated. In the San Diego region, about 71 percent[18] of wastewater treatment methane emissions are captured through biogas collection systems, but the remainder escape into the atmosphere and contribute the jurisdiction's impact on climate change.

4.3 Community Emissions Forecast

To illustrate the potential emissions growth based on projected trends in energy use, driving habits, job growth, and population growth from the baseline year going forward, this report includes an emissions forecast for the year 2020. Under a business-as-usual scenario, Vista's emissions will grow by approximately 20 percent by the year 2020, from 547,039 to 625,957 metric tons CO_2e. Figure 4.6 and Table 4.7 show the results of the forecast. A variety of different reports and projections were used to create the emissions forecast, as profiled below.

Figure 4.6: Community Emissions Forecast for 2020



18 San Diego County Greenhouse Gas Inventory, USD Energy Policy Initiatives Center.

Table 4.7: Community Emissions Growth Forecast by Sector

Sector	2005 (metric tons $CO_{2e)}$	2020 (metric tons CO_2e)	Annual Growth Rate	Percent Change from 2005 to 2020
Transportation	314,097	383,654	1.34%	22%
Commercial / Industrial	108,749	113,660	0.29%	5%
Residential	89,534	91,737	0.16%	2%
Solid Waste	30,310	32,275	0.42%	6%
Wastewater	4,349	4,631	0.42%	6%
TOTAL	**547,039**	**625,957**	--	**14%**

4.3.1 Residential Forecast

For the residential sector, a household projection for Vista conducted by the San Diego Association of Government (SANDAG) was used to estimate average annual compound growth in energy demand (0.16 percent). SANDAG estimates that the number of households in Vista was 29,506 in 2005, and will be 30,232 in 2020.[19]

4.3.2 Commercial / Industrial Forecast

The California Energy Commission's *California Energy Demand 2008-2018* shows that commercial floor space and the number of jobs have closely tracked the growth in energy use in the commercial sector. Using job growth projections for Vista provided by SANDAG, it was calculated that the average annual growth in energy use in the commercial / industrial sector between 2005 and 2020 will be 0.29 percent.[20]

4.3.3 Transportation Forecast

Growth in transportation emissions over the forecast period is closely related to planned transportation infrastructure investments and the associated vehicle activity, as measured in vehicle miles traveled (VMT). Long-term transportation infrastructure is planned through the 2030 San Diego Regional Transportation Plan, published by SANDAG in 2007, and travel activity projections performed by SANDAG are based on this plan, and account for buildout of the City of Vista General Plan Update 2030. These projections forecast a 22 percent increase in regional VMT between 2005 and 2020; this trend was applied to Vista's 2005 VMT to estimate 2020 travel activity. While this increase is attributed to regional travel as a whole and not specifically local travel in Vista, local VMT is likely

19 SANDAG 2050 Regional Growth Forecast (February 2010).
20 Ibid.

to follow a similar trend, and this forecasting approach is more reliable than applying state-wide travel forecasts to the local level.[21]

4.3.4 Solid Waste and Wastewater Forecast

Population is the primary determinate for growth in emissions pertaining to waste and wastewater generation. Therefore, the average annual population growth rate from 2005 to 2020 (0.42 percent, as calculated from above-referenced SANDAG population projections) was used to estimate future emissions from waste disposal and wastewater generated.

21 New fuel efficiency standards under the federal Corporate Average Fuel Economy (CAFE) program and State of California "Clean Car" standards under AB 1493 (Pavley) could significantly reduce the demand for transportation fuel in Vista. An analysis of potential fuel savings from these measures at a scale that would be useful for the purpose of this report has not been conducted, nor would such an analysis produce a true business-as-usual estimation.

Section Five: Conclusion

Conclusion

By participating in the San Diego Regional Climate Protection Initiative and other sustainability initiatives, the City of Vista has taken bold steps toward reducing its impacts on the environment. Staff and policymakers have chosen to take a leadership role in addressing climate change, and this leadership will allow the City to make tough decisions to create and implement innovative approaches to reduce its emissions. With increasing guidance and support from the state and the federal governments, Vista should be increasingly empowered to make the necessary changes to promote its vision for a more sustainable future.

This conclusion discusses the inventory as a baseline for emissions targets and suggests steps for the City of Vista to move forward to reduce emissions both from its internal operations and from the Vista community.

5.1 Toward Setting Emissions Reduction Targets

This inventory provides an emissions baseline that the City can use to inform Milestone Two of ICLEI's Five-Milestone process—setting emissions reduction targets. The greenhouse gas emissions reduction target is a goal to reduce emissions to a certain percentage below base year levels by a chosen planning horizon year. An example target might be a 20 percent reduction in emissions below 2005 levels by 2020. A target provides an objective toward which to strive and against which to measure progress. It allows a local government to quantify its commitment to fighting climate change—demonstrating that the jurisdiction is serious about its commitment and systematic in its approach.

In selecting a target, it is important to strike a balance between scientific necessity, ambition, and what is realistically achievable. The City of Vista will want to give itself enough time to implement chosen emissions reduction measures—but note that the farther out the target year is, the more that Vista should pledge to reduce. ICLEI recommends that regardless of the City's chosen long-term emissions reduction target (e.g., 15-year, 40-year), it should establish interim targets for every two- to three-year period. Near-term targets facilitate additional support and accountability, and help to ensure continued momentum around the City's local climate protection

efforts. To monitor the effectiveness of its programs, Vista should plan to re-inventory its emissions on a regular basis; many jurisdictions are electing to perform annual inventories. See Appendix F for more information on how to re-inventory the City's emissions.

5.1.1 The Long-Term Goal

ICLEI recommends that the City of Vista's near-term climate work should be guided by the long-term goal of reducing its emissions by 80 percent to 95 percent from the 2005 baseline level by the year 2050. By referencing a long-term goal that is in accordance with current scientific understanding, Vista can demonstrate that it intends to do its part to reduce emissions over the long haul.

It is important to keep in mind that it will be next to impossible for local governments to reduce emissions by 80 to 95 percent without the assistance of state and federal policy changes that create new incentives and new sources of funding for emissions reduction projects and programs. However, in the next 15 years, there is much that local governments can do to reduce emissions independently. It is also important that Vista works to reduce its emissions sooner, rather than later: the sooner a stable level of greenhouse gases in the atmosphere is achieved, the less likely it is that some of the most dire climate change scenarios will be realized.

5.1.2 State of California Targets and Guidance

An integral component of the State of California's climate approach has been establishing three core emissions reduction targets at the community level. While these targets are specific to the community-scale, they can be used to inform emissions targets for government operations as well. Figure 4.1 highlights adopted emissions targets for the State. The AB 32 Scoping Plan also provides further guidance on establishing targets for local governments; specifically the Plan suggests creating an emissions reduction goal of 15 percent below "current" levels by 2020. This target has informed many local government's emission reduction targets for municipal operations—most local governments in California with adopted targets have targets of 15 to 25 percent reductions under 2005 levels by 2020.

Figure 5.1: California Greenhouse Gas Reduction Targets

On June 1, 2005, California Governor Schwarzenegger signed Executive Order S-3-05 establishing climate change emission reductions targets for the State of California. The California targets are an example of near-, mid- and long-term targets:

Reduce emissions to 2000 levels by 2010
Reduce emissions to 1990 levels by 2020
Reduce emissions to 80 percent below 1990 levels by 2050

5.1.3 Department Targets

If possible, ICLEI recommends that Vista consider department-specific targets for each of the departments that generate emissions within its operations. This allows the City's staff to do a more in-depth analysis of what is

achievable in each sector in the near, mid and long-term, and also provides encourages each department head to consider their department's impact on the climate and institute a climate-conscious culture in its operations.

5.2 Creating an Emissions Reduction Strategy

This inventory identifies the major sources of emissions from the City of Vista and, therefore, where policymakers will need to target emissions reductions activities if they are to make significant progress toward adopted targets. For example, since the vehicle fleet was a major source of emissions from Vista's operations, it is possible that the City could meet near-term targets simply by implementing a few major actions within the vehicle fleet. In addition, medium-term targets could be met by focusing emissions reduction actions on buildings, parks, facilities, public lighting, and traffic signals and the long term (2050) target will not be achievable without major reductions in all of those sectors.

Given the results of the inventory, ICLEI recommends that Vista focus on the following tasks in order to significantly reduce emissions from its government operations:

- Continue to convert fleet to more fuel-efficient vehicles and alternative fuel vehicles on a replacement basis
- Install energy efficient equipment in City buildings and facilities
- Consider solar photovoltaic installations and solar thermal water heaters at municipal facilities.
- Replace streetlights with more energy efficient LED models
- Offer increased telecommuting options and vanpool/carpool incentives to eligible employees
- Foster solid waste reduction by ensuring recycling bins are provided at each facility and park
- Expand agency policies for reducing paper use. Such policies could include requiring double sided printing, and designating one printer tray for paper reuse
- Inform local elected officials, community leaders, and local and regional media about the causes and impacts of global warming

In addition to the types of actions described above, which reduce emissions from government operations, ICLEI recommends developing policies and actions that will help to reduce emissions throughout the community. Examples include:

- Promoting growth through redevelopment and infill that maintains or improves the quality of life for existing neighborhoods.
- Adopting local parking standards that encourage reduced single-occupancy vehicle travel.
- Adopting building codes that exceed Title 24 energy requirements, on either a mandatory or voluntary basis.

- Establish water conservation guidelines and standards for existing development, new development and City facilities
- Provide public education programs on waste prevention, source reduction, recycling, yard waste, wood waste, and hazardous waste

By identifying and implementing a set of these types of strategies, Vista should be able to reduce and reverse its impact upon global warming. In the process, it may also be able to improve the quality of its services, reduce costs, stimulate local economic development, and inspire local residents and businesses to redouble their own efforts to combat climate change.

Appendices

Appendix A:
The Local Government Operations Protocol

This inventory follows the standard outlined in the Local Government Operations Protocol, which was adopted in 2008 by the California Air Resources Board (ARB) and serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. This and the other inventories conducted for the San Diego Regional Climate Protection Initiative are among the first to follow LGOP, representing a strong step toward standardizing how inventories are conducted and reported.

A.1 Local Government Operations Protocol

A.1.1 Background

In 2008, ICLEI, ARB, and the California Climate Action Registry (CCAR) released LGOP to serve as a U.S. supplement to the International Emissions Analysis Protocol. The purpose of LGOP is to provide the principles, approach, methodology, and procedures needed to develop a local government operations greenhouse gas emissions inventory. It leads participants through the process of accurately quantifying and reporting emissions, including providing calculation methodologies and reporting guidance. LGOP guidance is divided into three main parts: identifying emissions to be included in the inventory, quantifying emissions using best available estimation methods, and reporting emissions.

The overarching goal of LGOP is to allow local governments to develop emissions inventories using standards that are consistent, comparable, transparent, and recognized nationally, ultimately enabling the measurement of emissions over time. LGOP adopted five overarching accounting and reporting principles toward this end: relevance, completeness, consistency, transparency and accuracy. Methodologies that did not adhere to these principles were either left out of LGOP or included as Scope 3 emissions. LGOP was created solely to standardize how emissions inventories are conducted and reported; as such it represents a currently accepted standard for inventorying emissions but does not contain any legislative or program-specific requirements. Mandates by the State of California or any other legislative body, while possibly using LGOP as a standard, do not currently exist, and California local governments are not currently required to inventory their emissions. Program-specific

requirements, such as ICLEI's Milestones or CCAR's reporting protocol, are addressed in LGOP but should not be confused with LGOP itself.

Also, while LGOP standardizes inventories from government operations, it does not seek to be a wholly accurate inventory of all emissions sources, as certain sources are currently excluded or otherwise impossible to accurately estimate. This and all emissions inventories therefore represent a best estimate of emissions using best available data and calculation methodologies; it does not provide a complete picture of all emissions resulting from the City of Vista's operations, and emissions estimates are subject to change as better data and calculation methodologies become available in the future.

A.1.2 Organizational Boundaries

Setting an organizational boundary for greenhouse gas emissions accounting and reporting is an important first step in the inventory process. The organizational boundary for the inventory determines which aspects of operations are included in the emissions inventory, and which are not. Under LGOP, two control approaches are used for reporting emissions: operational control or financial control. A local government has operational control over an operation if it has full authority to introduce and implement its operating policies at the operation. A local government has financial control if the operation is fully consolidated in financial accounts. If a local government has joint control over an operation, the contractual agreement will have to be examined to see who has authority over operating policies and implementation, and thus the responsibility to report emissions under operational control.[22] Local governments must choose which approach is the most applicable and apply this approach consistently throughout the inventory.

While both control approaches are acceptable, there may be some instances in which the choice may determine whether a source falls inside or outside of a local government's boundary. LGOP strongly encourages local governments to utilize operational control as the organization boundary for a government operations emissions inventory. Operational control is believed to most accurately represent the emissions sources that local governments can most directly influence, and this boundary is consistent with other environmental and air quality reporting program requirements. For this reason, all inventories in the San Diego Regional Climate Protection Initiative are being conducted according to the operational control framework.

22 Please see Local Government Operations Protocol for more detail on defining your organizational boundary: http://www.icleiusa.org/programs/climate/ghg-protocol

A.1.3 Types of Emissions

The greenhouse gases inventoried in this report are described in Section 2.1 As described in LGOP, emissions from each of the greenhouse gases can come in a number of forms:

Stationary or mobile combustion: These are emissions resulting from on-site combustion of fuels (natural gas, diesel, gasoline, etc.) to generate heat, electricity, or to power vehicles and mobile equipment.

Purchased electricity: These are emissions produced by the generation of power from utilities outside of the jurisdiction.

Fugitive emissions: Emissions that result from the unintentional release of greenhouse gases into the atmosphere (e.g., leaked refrigerants, methane from waste decomposition, etc.).

Process emissions: Emissions from physical or chemical processing of a material (e.g., wastewater treatment).

A1.4 Quantifying Emissions

Emissions can be quantified two ways:

Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility. This methodology is not generally available for most types of emissions and will only apply to a few local governments that have these monitoring systems.

The majority of the emissions recorded in the inventory can be and will be estimated using **calculation-based methodologies** to calculate their emissions using activity data and emission factors. To calculate emissions, the equation below is used:

Activity Data x Emission Factor = Emissions

Activity data refer to the relevant measurement of energy use or other greenhouse gas–generating processes such as fuel consumption by fuel type, metered annual energy consumption, and annual vehicle mileage by vehicle type. Emissions factors are calculated ratios relating emissions to a proxy measure of activity at an emissions source (e.g., CO_2 generated/kWh consumed). For a list of common emissions calculations see Table 2.2.

The guidelines in LGOP are meant to provide a common method for local governments to quantify and report greenhouse gas emissions by using comparable activity data and emissions factors. However, LGOP recognizes that local governments differ in how they collect data concerning their operations and that many are not able to meet the data needs of a given estimation method. Therefore, LGOP outlines both “recommended” and “alternative” methods

to estimate emissions from a given source. In this system, recommended methods are the preferred method for estimating emissions, as they will result in the most accurate estimate for a given emission source. Alternative methods often require less intensive data collection, but are likely to be less accurate. This approach allows local governments to estimate emissions based on the data currently available to them. It also allows local governments that are unable to meet the recommended methods to begin developing internal systems to collect the data needed to meet these methods.

This inventory has used the recommended activity data and emissions factors wherever possible, using alternative methods where necessary. For details on the methodologies used for each sector, see Appendix B.

A.1.5 Reporting Emissions

A.1.5.1 Significance Thresholds

Within any local government's own operations there will be emission sources that fall within Scope 1 and Scope 2 that are minimal in magnitude and difficult to accurately measure. Within the context of local government operations, emissions from leaked refrigerants and backup generators may be common sources of these types of emissions. For these less significant emissions sources, LGOP specifies that up to 5 percent of total emissions can be reported using estimation methods not outlined in LGOP.[23]

In this report, the following emissions fell under the significance threshold and were reported using best available methods:

- Scope 1 CH_4 and N_2O emissions from vehicle fleet

A.1.5.2 Units Used in Reporting Emissions

LGOP requires reporting of individual gas emissions, and this reporting is included in Appendix B. In this narrative report, emissions from all gases released by an emissions source (e.g., stationary combustion of natural gas in facilities) are combined and reported in metric tons of carbon dioxide equivalent (CO_2e). This standard is based on the global warming potential (GWP) of each gas, which is a measure of the amount of warming a greenhouse gas may cause, measured against the amount of warming caused by carbon dioxide. For the GWPs of reported greenhouse gases, see Table 2.1.

23 In the context of registering emissions with an independent registry (such as the California Climate Action Registry), emissions that fall under the significance threshold are called *de minimis*. This term, however, is not used in LGOP and was not used in this inventory.

A.1.5.3 Information Items

Information items are emissions sources that, for a variety of reasons, are not included as Scope 1, 2, or 3 emissions in the inventory. In order to provide a more complete picture of emissions from Vista's operations, however, these emissions should be quantified and reported.

In this report, the following emissions are included as information items (emission quantities are reported in Appendix B):

- Ozone depleting chemical used as refrigerants in vehicles (R-12)

A common emission that is categorized as an information item is carbon dioxide emitted in the combustion of biogenic fuels. Local governments will often burn fuels that are of biogenic origin (wood, landfill gas, organic solid waste, biofuels, etc.) to generate power. Common sources of biogenic emissions are the combustion of landfill gas from landfills or biogas from wastewater treatment plants, as well as the incineration of organic municipal solid waste at incinerators.

Carbon dioxide emissions from the combustion of biogenic fuels are not included in Scope 1 based on established international principles. [24] These principles indicate that biogenic fuels (e.g., wood, biodiesel), if left to decompose in the natural environment, would release CO_2 into the atmosphere, where it would then enter back into the natural carbon cycle. Therefore, when wood or another biogenic fuel is combusted, the resulting CO_2 emissions are akin to natural emissions and should therefore not be considered as human activity-generated emissions. The CH_4 and N_2O emissions, however, would not have occurred naturally and are therefore included as Scope 1 emissions.

A.2 Baseline Years

Part of the local government operations emissions inventory process requires selecting a "performance datum" with which to compare current emissions, or a base year. Local governments should examine the range of data they have over time and select a year that has the most accurate and complete data for all key emission sources. It is also preferable to establish a base year several years in the past to be able to account for the emissions benefits of recent actions. A local government's emissions inventory should comprise all greenhouse gas emissions occurring during a selected *calendar* year.

For the San Diego Regional Climate Protection Initiative, 2005 was chosen as the baseline year, since this year is increasingly becoming the standard for such inventories; the 1990 baseline year for California is usually difficult for most local governments to meet and would not produce the most accurate inventory.

24 Methane and nitrous oxide emissions from biogenic fuels are considered Scope 1 stationary combustion emissions and are included in the stationary combustion sections for the appropriate facilities.

After setting a base year and conducting an emissions inventory for that year, local governments should make it a practice to complete a comprehensive emissions inventory on a regular basis to compare to the baseline year. ICLEI recommends conducting an emissions inventory at least every five years.

Appendix B:
LGOP Standard Report

Local Government Operations Standard Inventory Report

1. Local Government Profile

Jurisdiction Name:	City of Vista
Street Address:	600 Eucalyptus Ave
City, State, ZIP, Country:	Vista, CA, 92084
Website Address:	www.cityofvista.com
Size (sq. miles):	19
Population:	94,109
Annual Budget:	$106,778,360
Employees (Full Time Equivalent):	389
Climate Zone:	3B
Annual Heating Degree Days:	1063*
Annual Cooling Degree Days:	866**
Lead Inventory Contact Name:	John Conley
Title:	Director of Community Development
Department:	Community Development
Email:	jconley@cityofvista.com
Phone Number:	(760) 639-6104

* www.ncdc.noaa.gov/oa/climate/online/ccd/nrmhdd.txt
** www.ncdc.noaa.gov/oa/climate/online/ccd/nrmcdd.txt

Services Provided:

☐ Water treatment	☐ Mass transit (buses)	☐ Hospitals	☐ Natural gas utility
☐ Water distribution	☐ Mass transit (light rail)	☐ Airport	☐ Other (Specify below)
☐ Wastewater treatment	☐ Mass transit (ferries)	☐ Seaport/shipping terminal	
☑ Wastewater collection	☐ Schools (primary/secondary)	☐ Marina	
☐ Electric utility	☐ Schools (colleges/universities)	☐ Stadiums/sports venues	
☑ Fire Protection	☐ Solid waste collection	☐ Convention center	
☐ Police	☐ Solid waste disposal	☑ Street lighting and traffic signals	

Local Government Description:

The City of Vista is situated approximately 7 miles inland from the Pacific Ocean in northern San Diego County. Vista is the "Hub of the North County" area. With a population of approximately 94,048, it is a semi-rural, residential community. Vista's Mediterranean climate provides mild winters and cool summers for year-round outdoor activities. While Vista incorporated in 1963 as a general law city, it became a charter city on June 13, 2007. The city maintains its own Fire Department, while law enforcement is furnished by the San Diego County Sheriff's Department.

2. GHG Inventory Details

Reporting Year:	2005
Protocol Used:	Local Government Operations Protocol, Version 1.0 (September 2008)
Control Approach:	Operational Control

GHG Emissions Summary (All Units in Metric Tons Unless Stated Otherwise)

Note: CO_2e totals listed here are summed totals of the estimated emissions of each inventoried gas based upon their global warming potentials (Appendix E of LGOP)

BUILDINGS & OTHER FACILITIES

SCOPE 1

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Stationary Combustion	192.681	192.178	0.018	0.000			
Fugitive Emissions							
Total Direct Emissions from Buildings & Facilities	192.681	192.178	0.018	0.000	0.000	0.000	0.000

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	630.307	625.705	0.033	0.013
Purchased Steam				
District Heating & Cooling				
Total Indirect Emissions from Buildings & Facilities	630.307	625.705	0.033	0.013

STREETLIGHTS AND TRAFFIC SIGNALS

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O
Purchased Electricity	658.564	653.756	0.035	0.013
Total Indirect Emissions from Streetlights and Traffic Signals	658.564	653.756	0.035	0.013

WATER DELIVERY FACILITIES

SCOPE 2

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
Purchased Electricity	22.737	22.571	0.001	0.000			
Total Indirect Emissions from Water Delivery Facilities	22.737	22.571	0.001	0.000	0.000	0.000	0.000

VEHICLE FLEET

SCOPE 1

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs
Mobile Combustion	1,095.888	1,081.277	0.032	0.045		
Fugitive Emissions	35.880					
Total Direct Emissions from Vehicle Fleet	1,131.768	1,081.277	0.032	0.045	0.000	0.000

INDICATORS		
	Number of Vehicles	140
	Number of Pieces of Equipment	76

WASTE GENERATION

SCOPE 3

	CO_2e
Waste All Facilities	113.566

EMPLOYEE COMMUTE

SCOPE 3

	CO_2e
Mobile Combustion	1,113.982

INDICATORS		
	Vehicle Miles Traveled	2,175,205

INFORMATION ITEMS

	CO_2e
R12	11.900
Total Information Items	11.900

Total Emissions

	CO_2e	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6
SCOPE 1	1,324.449	1,273.456	0.050	0.045	0.000	0.000	0.000
SCOPE 2	1,311.607	1,302.031	0.069	0.026	0.000	0.000	0.000
SCOPE 3	1,227.548						
INFORMATION ITEMS	11.900						

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS

- Employee Commute
- Employee Business Travel
- Emissions From Contracted Services
- Upstream Production of Materials and Fuels
- Upstream and Downstream Transportation of Materials and Fuels
- Waste Related Scope 3 Emissions
- Purchase of Electricity Sold to an End User
- Transmission and Distribution Losses from Consumed Electricity
- Other Scope 3

POSSIBLE INFORMATION ITEMS

- Biogenic CO_2 from Combustion
- Carbon Offsets Purchased
- Carbon Offsets Sold
- Renewable Energy Credits (Green Power) Purchased
- Renewable Energy Credits Sold (GreenPower)
- Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
- Other Information Items

Local Government Operations Standard Inventory Report

3. Activity Data Disclosure

Every emission source must be accompanied by a reference for the activity data. This worksheet is meant to assist in recording activity data and the methods used to gather those data for government operations. Activity data represent the magnitude of human activity resulting in emissions; data on energy use, fuel consumtion, vehicle miles traveled, and waste generation are all examples of activity data that are used to compute GHGs. Detailed disclosure should be made of the activity data used and at what quantities. This disclosure should also cite the source(s) of the data and the methodology used, including whether that methodology is a recommended method or an alternate method.

Deviations from the primary methodology should be explained in detail. All assumptions and estimations should be cited as such. Local governments may also use this space in the reporting format to discuss the rationale for the inclusion or exclusion of optional inventory components. It is good practice to include appropriate citations (such as website URL, report title, etc) and all contact information that is necessary to verify the source and accuracy of the activity data.

BUILDINGS & OTHER FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Natural Gas	CO_2e					
	CO_2	Primary	Known fuel use	35,613	therms	SDGE, Steve Campbell, smcampbell@semprautilities.com
	CH_4	Primary	Known fuel use	35,613	therms	SDGE, Steve Campbell, smcampbell@semprautilities.com
	N_2O	Primary	Known fuel use	35,613	therms	SDGE, Steve Campbell, smcampbell@semprautilities.com
	HFCs					
	PFCs					
	SF_6					

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Diesel Generators	CO_2e					
	CO_2	Primary	Estimated run time and fuel efficiency	140	gallons	Ken Shaw, Facilities Director, (760) 277-8102, kshaw@cityofvista.com
	CH_4	Primary	Estimated run time and fuel efficiency	140	gallons	Ken Shaw, Facilities Director, (760) 277-8102, kshaw@cityofvista.com
	N_2O	Primary	Estimated run time and fuel efficiency	140	gallons	Ken Shaw, Facilities Director, (760) 277-8102, kshaw@cityofvista.com
	HFCs					
	PFCs					
	SF_6					

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Electricity	CO_2e					
	CO_2	Primary	Known Electricity Use	2,524,326	kWh	SDGE, Steve Campbell, smcampbell@semprautilities.com
	CH_4	Primary	Known Electricity Use	2,524,326	kWh	SDGE, Steve Campbell, smcampbell@semprautilities.com
	N_2O	Primary	Known Electricity Use	2,524,326	kWh	SDGE, Steve Campbell, smcampbell@semprautilities.com
	HFCs					
	PFCs					
	SF_6					

STREETLIGHTS AND TRAFFIC SIGNALS (Chapter 6.2)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Electricity	CO_2e					
	CO_2	Primary	Known Electricity Use	2,637,493	kWh	SDGE, Steve Campbell, smcampbell@semprautilities.com
	CH_4	Primary	Known Electricity Use	2,637,493	kWh	SDGE, Steve Campbell, smcampbell@semprautilities.com
	N_2O	Primary	Known Electricity Use	2,637,493	kWh	SDGE, Steve Campbell, smcampbell@semprautilities.com
	HFCs					
	PFCs					
	SF_6					

WATER DELIVERY FACILITIES (Chapter 6)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Electricity	CO_2e					
	CO_2	Primary	Known Electricity Use	91,059	kWh	SDGE, Steve Campbell, smcampbell@semprautilities.com
	CH_4	Primary	Known Electricity Use	91,059	kWh	SDGE, Steve Campbell, smcampbell@semprautilities.com
	N_2O	Primary	Known Electricity Use	91,059	kWh	SDGE, Steve Campbell, smcampbell@semprautilities.com
	HFCs					
	PFCs					
	SF_6					

VEHICLE FLEET (Chapter 7)

SCOPE 1

Mobile Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Gasoline	CO_2e					
	CO_2	Alternate	Known fuel use for City. Fire Fleet fuel use estimated from approximate yearly VMT.	65,069	gallons	Cindy Sanchez, 760.726.1340 x1607, cmsanchez@cityofvista.com. Jeff Hahn, (760) 726-1340 x2109, jhahn@cityofvista.com
	CH_4	Alternate	Known fuel use for City. Fire Fleet fuel use estimated from approximate yearly VMT.	65,069	gallons	Cindy Sanchez, 760.726.1340 x1607, cmsanchez@cityofvista.com. Jeff Hahn, (760) 726-1340 x2109, jhahn@cityofvista.com
	N_2O	Alternate	Known fuel use for City. Fire Fleet fuel use estimated from approximate yearly VMT.	65,069	gallons	Cindy Sanchez, 760.726.1340 x1607, cmsanchez@cityofvista.com. Jeff Hahn, (760) 726-1340 x2109, jhahn@cityofvista.com
	HFCs					
	PFCs					
	SF_6					
Diesel	CO_2e					
	CO_2	Alternate	Known fuel use for City. Fire Fleet fuel use estimated from approximate yearly VMT.	50,112	gallons	Cindy Sanchez, 760.726.1340 x1607, cmsanchez@cityofvista.com. Jeff Hahn, (760) 726-1340 x2109, jhahn@cityofvista.com
	CH_4	Alternate	Known fuel use for City. Fire Fleet fuel use estimated from approximate yearly VMT.	50,112	gallons	Cindy Sanchez, 760.726.1340 x1607, cmsanchez@cityofvista.com. Jeff Hahn, (760) 726-1340 x2109, jhahn@cityofvista.com
	N_2O	Alternate	Known fuel use for City. Fire Fleet fuel use estimated from approximate yearly VMT.	50,112	gallons	Cindy Sanchez, 760.726.1340 x1607, cmsanchez@cityofvista.com. Jeff Hahn, (760) 726-1340 x2109, jhahn@cityofvista.com
	HFCs					
	PFCs					
	SF_6					

Fugitive Emissions

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Refrigerants	R134A	Alternate	Based on Fleet Inventory and Capacities Available Online. Defaults used for Unknown Capacities	28	kg	Cindy Sanchez, 760.726.1340 x1607, cmsanchez@cityofvista.com. NAPA AC System Refrigerant and Oil Capacity Guide

WASTE GENERATION (Scope 3)

SCOPE 3

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Generated Waste	CH_4	Alternate	Estimated waste weight based upon volume and number of containers	507	tons	Jeff Ritchie, EDCO, 760-744-5615 x119, jritchie@edcodisposal.com

EMPLOYEE COMMUTE (Scope 3)

SCOPE 3

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Gasoline	CO_2e					
	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	114,234	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of John Conley, Director of Community Development
	CH_4	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	114,234	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of John Conley, Director of Community Development
	N_2O	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	114,234	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of John Conley, Director of Community Development
	HFCs					
	PFCs					
	SF_6					
Diesel	CO_2e					
	CO_2	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	7,218	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of John Conley, Director of Community Development
	CH_4	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	7,218	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of John Conley, Director of Community Development
	N_2O	Alternate	Proxy Year Estimated Fuel Use-based upon daily vehicle miles traveled for all repspondents extrapolated to represent all local government employees	7,218	gallons	Online and paper surveys of all employees; see Appendix C of Narrative report for examples; Data in posession of John Conley, Director of Community Development
	HFCs					
	PFCs					
	SF_6					

INFORMATION ITEMS

Stationary Combustion

Emissions Source Name	GHG	Methodology Type	Methodology Name and Description	Resource Quantity	Fuel Unit	Data Sources and References
Ozone Depleting Refrigerants	R12	Alternate	Based on Fleet Inventory and Capacities Available Online. Defaults used for Unknown Capacities	1	kg	Cindy Sanchez, 760.726.1340 x1607, cmsanchez@cityofvista.com. NAPA AC System Refrigerant and Oil Capacity Guide

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS

Employee Commute
Employee Business Travel
Emissions From Contracted Services
Upstream Production of Materials and Fuels
Upstream and Downstream Transportation of Materials and Fuels
Waste Related Scope 3 Emissions
Purchase of Electricity Sold to an End User
Transmission and Distribution Losses from Consumed Electricity
Other Scope 3

POSSIBLE INFORMATION ITEMS

Biogenic $C0_2$ from Combustion
Carbon Offsets Purchased
Carbon Offsets Sold
Renewable Energy Credits (Green Power) Purchased
Renewable Energy Credits Sold (GreenPower)
Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
Other Information Items

Local Government Operations Standard Inventory Report

4. Calculation Methodology Disclosure

In addition to activity data, every emission source must be accompanied by the emission factor used, a reference for each emission factor, and the calculation

BUILDINGS & OTHER FACILITIES (Chapter 6)

SCOPE 1

Stationary Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Natural Gas	CO_2e			
	CO_2	Default	53.06 Kg /MMBtu	LGOP, Table G.1
	CH_4	Default	5 g /MMBtu	LGOP, Table G.3
	N_2O	Default	0.01 g /MMBtu	LGOP, Table G.3
	HFCs			
	PFCs			
	SF_6			
Diesel Generators	CO_2e			
	CO_2	Default	73.15 Kg /MMBtu	LGOP, Table G.1
	CH_4	Default	11 g /MMBtu	LGOP, Table G.3
	N_2O	Default	0.6 g /MMBtu	LGOP, Table G.3
	HFCs			
	PFCs			
	SF_6			

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e			
	CO_2	Default	546.46 lbs/MWh	LGOP, Table G.5
	CH_4	Default	0.029 lbs/ MWh	LGOP, Table G.6
	N_2O	Default	0.011 lbs/MWh	LGOP, Table G.6
	HFCs			
	PFCs			
	SF_6			

STREETLIGHTS AND TRAFFIC SIGNALS (Chapter 6.2)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e			
	CO_2	Default	546.46 lbs/MWh	LGOP, Table G.5
	CH_4	Default	0.029 lbs/ MWh	LGOP, Table G.6
	N_2O	Default	0.011 lbs/MWh	LGOP, Table G.6
	HFCs			
	PFCs			
	SF_6			

WATER DELIVERY FACILITIES (Chapter 6)

SCOPE 2

Purchased Electricity

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Electricity	CO_2e			
	CO_2	Default	546.46 lbs/MWh	LGOP, Table G.5
	CH_4	Default	0.029 lbs/ MWh	LGOP, Table G.6
	N_2O	Default	0.011 lbs/MWh	LGOP, Table G.6
	HFCs			
	PFCs			
	SF_6			

VEHICLE FLEET (Chapter 7)

SCOPE 1

Mobile Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Gasoline	CO_2e			
	CO_2	Default	8.81 kg CO2 / gallon	LGOP, Table G.9
	CH_4	Default	Varies by Model Year	LGOP, Table G.10
	N_2O	Default	Varies by Model Year	LGOP, Table G.10
	HFCs			
	PFCs			
	SF_6			
Diesel	CO_2e			
	CO_2	Default	10.15 kg /gallon	LGOP, Table G.9
	CH_4	Default	Varies by Model Year	LGOP, Table G.10
	N_2O	Default	Varies by Model Year	LGOP, Table G.10
	HFCs			
	PFCs			
	SF_6			

Fugitive Emissions

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Refrigerants	R134A	None	GWP- 1300	LGOP, Table E.1

WASTE GENERATION (Scope 3)

SCOPE 3

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Generated Waste	CH_4	Alternate	Varies by waste type	EPA Waste Reduction Model http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html; Public Administration waste charaterization provided by CIWMB

EMPLOYEE COMMUTE (Scope 3)

SCOPE 3

Stationary Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Gasoline	CO_2e			
	CO_2	Default	8.81 kg CO2 / gallon	LGOP, Table G.9
	CH_4	Default	.03451 g/mi (light trucks)	LGOP, Table G.13
	N_2O	Default	.04935 g/mi (light trucks)	LGOP, Table G.13
	HFCs			
	PFCs			
	SF_6			
Diesel	CO_2e			
	CO_2	Default	10.15 kg/gallon	LGOP, Table G.9
	CH_4	Default	.00098 g/mi (light trucks)	LGOP, Table G.13
	N_2O	Default	.00148 g/mi (light trucks)	LGOP, Table G.13
	HFCs			
	PFCs			
	SF_6			

INFORMATION ITEMS

Stationary Combustion

Emissions Source Name	GHG	Default/Alternate	Emission Factor	Emission Factor Sources and References
Ozone Depleting Refrigerants	R12	None	GWP- 10600	http://www.epa.gov/ozone/science/ods/classone.html

POSSIBLE SOURCES OF OPTIONAL SCOPE 3 EMISSIONS	POSSIBLE INFORMATION ITEMS
Employee Commute	Biogenic $C0_2$ from Combustion
Employee Business Travel	Carbon Offsets Purchased
Emissions From Contracted Services	Carbon Offsets Sold
Upstream Production of Materials and Fuels	Renewable Energy Credits (Green Power) Purchased
Upstream and Downstream Transportation of Materials and Fuels	Renewable Energy Credits Sold (GreenPower)
Waste Related Scope 3 Emissions	Ozone-depleting Refrigerants/Fire Suppressants not in LGOP
Purchase of Electricity Sold to an End User	Other Information Items
Transmission and Distribution Losses from Consumed Electricity	
Other Scope 3	

Appendix C: Employee Commute

Emissions from employee commutes make up an important optional source of emissions from any local government's operations. The scale of emissions from employee commutes is often large in comparison with many other facets of local government operations, and local governments can affect how their employees get to and from work through a variety of incentives. For this reason, ICLEI recommends estimating emissions from employee commutes as part of a complete government operations greenhouse gas emissions inventory.

To assist in the data collection process, ICLEI provided the jurisdictions with both an online and a paper copy of an employee commute survey.[25] The questions in the survey were aimed at finding three categories of information:

- **Activity data** to calculate emissions from employee commute (vehicles miles traveled, vehicle type, vehicle model year) in the current year (2009).
- **Indicator data** to help the City of Vista understand how much time and money employees spend as they commute, as well as how many employees use alternative modes of transportation to get to work.
- **Policy data** that will serve as guidance for the City as it adopts policies aimed at reducing emissions from employee commutes. These questions asked employees for their interest in alternative modes of transportation as well as what policies would be most effective in allowing them to switch modes of transportation away from driving alone.

This section provides the emissions estimation methodology and a copy of the survey. Individual survey results are in the possession of Vista staff.

C.1 Methodology Summary

The methodology for estimating the employee commute emissions portion of the inventory is similar to the mobile emissions methodology outlined in the mobile emissions section of Appendix B. The City of Vista administered the employee commute survey to 389 current employees working for the City, and 169 employees responded to the

25 The paper survey was administered only to employees that do not have access to a computer. The survey asked slightly different questions but was aimed at garnering the same emissions and policy-relevant data as the electronic survey.

survey (a response rate of 43 percent). The survey was administered in 2009 and current data was used as a proxy for 2005 data. Both full time and part-time employee data were included.

To calculate emissions, the survey collected the following information:

- The number of days and number of miles employees drive alone to work (one-way) in an average week
- The number of days they carpooled and how often they drove the carpool in an average week
- The vehicle type of their vehicle and the type of fuel consumed

These weekly data were then converted into annual VMT estimates by the following equation:

Number of days driven to work/week x to-work commute distance x 2 x 48 weeks worked/year

Actual CO_2e emissions from respondents' vehicles were calculated by converting vehicle miles traveled per week by responding employees into annual fuel consumption by fuel type (gasoline, diesel). The VMT data collected were converted to fuel consumption estimates using fuel economy of each vehicle type.[26]

ICLEI then extrapolated estimated fuel consumption to represent all 389 of Vista's employees in 2005. This was a simple extrapolation, multiplying the estimated fuel consumption number by the appropriate factor to represent all employees. For example, if 33.3 percent of employees responded, fuel consumption numbers were tripled to estimate fuel consumption for all employees. This is not a statistical analysis and no uncertainty has been calculated as there is uncertainty not only at the extrapolation point but also in the calculation of actual emissions. Therefore, the resulting calculated emissions should be seen as directional and not as statistically valid.

26 Fuel efficiency estimates from www.fueleconomy.gov, EPA *Green Fleets Guide* and other national sources.

C.2 Employee Commute Survey

1. Introduction
The purpose of this survey is to gather information on your commute to work so your employer can offer the best transportation options to you while reducing the jurisdiction's impact on the environment. The survey should take no more than 15 minutes.

Unless otherwise indicated, all questions refer to a ONE-WAY commute TO WORK only. Please do not include any traveling you do during work hours (meetings, site visits, etc). Any question with an asterisk (*) next to it requires an answer in order to proceed.

Please note that this survey is completely anonymous. We will not collect or report data on any individuals who respond to the survey.

Thank you very much.

2. Workplace
Please provide the following information regarding your workplace. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What local government do you currently work for?
Carlsbad
County of San Diego
Encinitas
Imperial Beach
La Mesa
National City
Poway
Solana Beach
San Marcos
Vista

*2. What department do you work in?

3. Commuter Background Information
Please provide the following information regarding your background. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What city/town do you live in?

*2. How many miles do you live from your place of work?
(please enter a whole number)

3. How many minutes does your commute to work typically take?
(please enter a whole number)

4. In a typical week, how much money do you spend on your ROUND TRIP commute? (transit fees, gas, tolls, etc-please enter a number)

5. If you drive to work, what type of vehicle do you usually drive?
Full-size auto
Mid-size auto
Compact/hybrid
Light truck/SUV/Pickup
Van

Heavy Truck
Motorcycle/scooter

6. What year is your vehicle?
(please enter a four digit year)

7. What type of fuel does your vehicle use?
Gas
Diesel
Biodiesel (B20)
Biodiesel (B99 or B100)
Electric
Other (please specify-if Ethanol please indicate grade)

4. Employment Information
Please provide the following information regarding your employment. Click "Next" at the bottom when finished or click "Prev" to go back.

1. Do you typically travel to work between 6-9 am Monday-Friday?
Yes
No
If No, please specify what time of day you commute:

2. Does your position allow you to have flexible hours or to telecommute?
Yes
No

*3. Are you a full time employee or part time employee?
Full
Part

5. Part Time Employees
Please provide the following information regarding your part time employment. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. What is the average number of days you work per week?
(please enter a number)

6. Temporary Employees

Are you a temporary employee?
Yes
No

7. Temporary Employees

How many weeks is your temporary assignment? (please enter a number)

8. Current Daily Commute
Please provide the following information regarding your current daily commute. Click "Next" at the bottom when finished or click "Prev" to go back.

*1. In a typical week, do you drive to work alone at least once?
Yes
No

9. Drive Alone

Click "Next" at the bottom when finished or click "Prev" to go back.

*1. How many DAYS a week do you drive alone to work?
(please enter a number)

*2. How many MILES PER DAY do you drive TO WORK ONLY?
(please enter a number)

10. Carpool
Click "Next" at the bottom when finished or click "Prev" to go back.

*1. In a typical week, do you carpool to work at least once?
Yes
No

11. Carpool
*1. How many DAYS a week do you carpool?
(please enter a number)

*2. How many MILES do you drive TO WORK ONLY when you carpool?
(please enter a number)

3. How many PEOPLE are in your carpool?
(please enter a number)

*4. How many DAYS a week are you the driver of the carpool?
(please enter a number)

12. Public Transit
*1. In a typical week, do you take public transit to work at least once?
Yes
No

13. Public Transit
*1. How many DAYS a week do you take public transit TO WORK?
(please enter a number)

2. What type of public transit do you take TO WORK?
Bus
Ferry
Light Rail
Train
Other (please specify)

14. Bike/Walk
*1. In a typical week, do you bike or walk to work at least once?
Yes
No

15. Bike/Walk
1. How many DAYS a week do you bike to work?
(please enter a number)

2. How many DAYS a week do you walk to work?
(please enter a number)

16. Telecommute

1. If you telecommute:
How many DAYS do you telecommute in a typical week?
(please enter a number)
If you do not telecommute, leave this question blank.

17. Commute Preference Information
Please answer the following questions regarding your CURRENT commute.

1. Why have you chosen your current commute mode?

2. Would you consider taking any of the following transportation modes? (check all that apply):
Public Transportation
Carpooling
Vanpooling
Bicycling
Walking
Other (please specify)

*3. Is there a transit route that you would use to commute by public transit?
Yes
No

4. If no to question 3, please explain why not.

5. If you drive alone, which, if any, of the following benefits would encourage you to take alternative forms of transportation? (check all that apply)
Vanpool/carpool incentives
Pre-tax transit checks
Parking cash-out (reimbursement to give up your parking spot)
Improved transit options
Improved walking routes/conditions
Telecommuting option
Free/inexpensive shuttle
Free public transit benefit
Subsidizing bicycle purchase
Improved bike routes/conditions
Better information about my commute options
None of the above
Other (please specify)

28. Comments

1. If you have other concerns or issues related to your commute, or if something we should know about was not captured in any survey questions, please describe below.

29. Thank You
Thank you for responding to this survey!

Appendix D: Government-Generated Solid Waste Methodology

Emissions from the waste sector are an estimate of methane generation that will result from the anaerobic decomposition of all organic waste sent to landfill in the base year. It is important to note that although these emissions are attributed to the inventory year in which the waste is generated, the emissions themselves will occur over the 100+ year timeframe that the waste will decompose. This frontloading of emissions is the approach taken by EPA's Waste Reduction Model (WARM). Attributing all future emissions to the year in which the waste was generated incorporates all emissions from actions taken during the inventory year into that year's greenhouse gas release. This facilitates comparisons of the impacts of actions taken between inventory years and between jurisdictions. It also simplifies the analysis of the impact of actions taken to reduce waste generation or divert it from landfills.

D.1 Estimating Waste Tonnages from the City of Vista's Operations

Like most local governments, the City of Vista does not directly track the amount of waste generated from its operations. Therefore, to estimate the amount of waste generated, ICLEI worked with EDCO, the hauler of waste for Vista in 2005. The amount of waste was estimated by compiling pick-up accounts owned by the City. Garbage trucks do not weigh waste at each pick-up, therefore, it is not possible to directly track disposal figures in mass per facility. Mass of waste generation was estimated using volumetric container size (gallons, yards, etc.) data, along with pick-up frequency and average fill of containers. These data produced a comprehensive annual volumetric figure, which was then converted to mass using standard conversion factors supplied by the California Integrated Waste Management Board (CIWMB). Estimated waste *generation* was converted to final *disposal* (quantity sent to landfill) by applying average waste diversion percentages for each account. Where applicable, self-haul waste (waste brought directly from the local government to landfills) was included as part of this total.

D.2 Emissions Calculation Methods

As some types of waste (e.g., paper, plant debris, food scraps, etc.) generate methane within the anaerobic environment of a landfill and others do not (e.g., metal, glass, etc.), it is important to characterize the various

components of the waste stream. Waste characterization for government-generated solid waste was estimated using the CIWMB's 2004 statewide waste characterization study.[27]

Most landfills in the San Diego region capture methane emissions either for energy generation or for flaring. EPA estimates that 60 percent to 80 percent[28] of total methane emissions are recovered at the landfills to which the City sends its waste. Following the recommendation of LGOP, ICLEI adopted a 75 percent methane recovery factor.

Recycling and composting programs are reflected in the emissions calculations as reduced total tonnage of waste going to the landfills. The model, however, does not capture the associated emissions reductions in "upstream" energy use from recycling as part of the inventory.[29] This is in-line with the "end-user" or "tailpipe" approach taken throughout the development of this inventory. It is important to note that, recycling and composting programs can have a significant impact on greenhouse gas emissions when a full lifecycle approach is taken. Manufacturing products with recycled materials avoids emissions from the energy that would have been used during extraction, transporting and processing of virgin material.

D.2.1 Methane Commitment Method

CO_2e emissions from waste disposal were calculated using the methane commitment method outlined in the EPA WARM model. This model has the following general formula:

$CO_2e = W_t * (1-R)A$

Where:

W_t is the quantify of waste type "t"

R is the methane recovery factor,

A is the CO_2e emissions of methane per metric ton of waste at the disposal site (the methane factor)

While the WARM model often calculates upstream emissions, as well as carbon sequestration in the landfill, these dimensions of the model were omitted for this particular study for two reasons:

This inventory functions on an end-use analysis, rather than a life-cycle analysis, which would calculate upstream emissions), and this inventory solely identifies emissions sources, and no potential sequestration "sinks."

27 CIWMB Waste Characterization Study-Public Administration Group available at http://www.ciwmb.ca.gov/WasteChar/BizGrpCp.asps.
28 AP 42, section 2.4 Municipal Solid Waste, 2.4-6, http://www.epa.gov/ttn/chief/ap42/index.html
29 "Upstream" emissions include emissions that may not occur in your jurisdiction resulting from manufacturing or harvesting virgin materials and transportation of them.

Appendix E: Community Inventory Methodology

This appendix expands on the description of methodology provided in Section 2, describing in more detail the data sources and processes used to calculate emissions in the community inventory.

E.1 Overview of Inventory Contents and Approach

The community inventory describes emissions of the major greenhouse gases from the residential, commercial / industrial, transportation, solid waste, and wastewater sectors. As explained in Section 2, emissions are calculated by multiplying activity data—such as kilowatt hours or gallons of gasoline consumed—by emissions factors, which provide the quantity of emissions per unit of activity. Activity data is typically available from electric and gas utilities, planning and transportation agencies and air quality regulatory agencies. Emissions factors are drawn from a variety of sources, including the California Climate Action Registry, the Local Governments Operations Protocol, and air quality models produced by the California Air Resources Board (ARB).

In this inventory, all GHG emissions are converted into carbon dioxide equivalent units, or CO_2e, per guidance in the Local Government Operations Protocol (LGOP). The LGOP provides standard factors to convert various greenhouse gases into carbon dioxide equivalent units; these factors are known as Global Warming Potential factors, representing the ratio of the heat-trapping ability of each greenhouse gas relative to that of carbon dioxide.

The community inventory methodology is based on guidance from ICLEI's draft International Local Government GHG Emissions Analysis Protocol (IEAP), as well as methods utilized in the *San Diego County Greenhouse Gas Inventory* produced by the University of San Diego's Energy Policy Initiatives Center (EPIC), and in ongoing climate change planning work at SANDAG.

E.1.1 Emissions Sources Included and Excluded

In general, local jurisdictions should seek to measure all emissions of the six Kyoto Protocol greenhouse gases[30] occurring within the jurisdictional boundaries. In practice, this level of detail may not be feasible for the local jurisdiction. The table below describes sources included in this community inventory, followed by sources that were excluded:

Sector	Emissions Source	Sector	Emissions Source
Residential	Bundled Electricity	**Transportation**	***On-Road Transportation***
	Direct Access Electricity		Travel on Local/Regional Roads
	Bundled Natural Gas		Travel on State Highways
	Direct Access Natural Gas		
Commercial / Industrial	Bundled Electricity		***Off-Road Sources***
	Direct Access Electricity		Lawn and Garden Equipment
	Bundled Natural Gas		Construction Equipment
	Direct Access Natural Gas		Industrial Equipment
Solid Waste	Community-generated Solid Waste		Light Commercial Equipment
	Landfill Waste-in-Place	**Wastewater**	Community-generated Wastewater

Local governments will often choose to exclude emissions sources that meet the following criteria:

- ***Below the significance threshold***. In the ICLEI reporting standard, emissions sources can be excluded from the analysis (e.g. are "de minimis") if, when combined, the excluded emissions total less than 5% of the total of the emissions from the Community or Government Inventory.[31]
- ***Insufficient data or accepted standard methodology.*** The science is still evolving in many sectors, and accurate records or standards for measuring emissions are not always available. Examples include non-combustion industrial emissions sources or emissions from composting activities.
- ***Emissions largely located outside the jurisdiction's boundaries.*** These types of emissions could include such sources as aviation departing from local airports or regional transit emissions.

30 $CO2$, CH_4, N_2O, SF_6, perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs)
31 Note: an inventory should include at least 95% of the emissions released by the government and community as a whole. Therefore, if a large number of small emissions sources occur within the jurisdiction, they cannot all be ignored.

In this inventory, the following emissions were below the significance threshold and were not included:

- $SF_{6,}$ perfluorocarbons (PFCs), and hydrofluorocarbon (HFCs) emissions
- N_2O emissions from transportation
- Emissions of minor off-road sources (those not included in the table above)
- Stationary emissions from propane and diesel fuels
- Non-combustion industrial emissions sources

The following sources were excluded because they occurred largely outside the jurisdiction's boundaries:

- Aviation
- Rail
- Regional public transit

E.2 Emissions Forecast

This inventory includes a "business-as-usual" forecast to 2020, estimating emissions that will occur if no new emissions reduction policies are implemented. The forecast is based on household, population, and job projections from SANDAG's *2050 Regional Growth Forecast Update*. As a business-as-usual projection, the forecast does not take into account legislation or regulation currently under development, and relies on demographic data as the basis for estimating growth in each sector. The forecasting approach varies for each sector:

- Residential emissions are based on projected growth in local jurisdiction *households*.
- Commercial / industrial sector emissions are correlated with forecasted *job growth* in the local jurisdiction.
- Transportation emissions are based on projected growth rates in *regional vehicle miles traveled* associated with SANDAG's Regional Transportation Plan 2030, with revisions based on the City of Vista General Plan Update 2030.
- Solid waste and wastewater emissions are correlated with forecasted *population* growth in the local jurisdiction.

E.3 The Built Environment: Residential, Commercial, and Industrial Sectors

Electricity and natural gas sold to San Diego Gas & Electric customers as bundled service (both energy generation and transmission/distribution) was provided by Benjamin Lopez at SDG&E. Direct access electricity and natural gas was also provided by SDG&E, which records the direct access resources that are distributed through its grid. Bundled SDG&E electricity emissions were calculated in ICLEI's CACP software using SDG&E-specific emissions factors provided by the California Climate Action Registry. Direct access electricity consumption was

calculated in CACP using EPA eGrid emissions factors for the WECC California eGrid subregion. All natural gas emissions were calculated in CACP with default emissions factors from the Local Government Operations Protocol.

E.4 On-road Transportation and Off-road Mobile Sources

E.4.1 On-road Transportation

On-road transportation emissions were derived from local jurisdiction vehicle miles traveled (VMT) data and regional vehicle and travel characteristics. Observed 2005 VMT on non-State facilities (referred to in the inventory as "local roads") was obtained from Caltrans' Highway Performance Monitoring System reports. VMT on state highways in the local jurisdiction was derived from a GIS shapefile output from the SANDAG transportation model, which is the basis of air quality reporting associated with the Regional Transportation Plan. For state highway segments that crossed jurisdictional boundaries, the segments were clipped in GIS and only the portion within the boundaries was accounted for.

The EMFAC2007 model developed by ARB was used to calculate emissions from these VMT figures. EMFAC defaults for San Diego County include regionally-specific information on the mix of vehicle classes and model years, as well as ambient conditions and travel speeds, that determine fuel efficiency. The model estimates carbon dioxide and methane emissions from these factors and inputted vehicle activity data.

Because inputting local VMT without changing regional defaults for vehicle population and vehicle trips would result in an over-estimation of emissions, regionally-specific ratios of VMT to vehicle population and trips were held constant.

EMFAC outputs are reported in short tons per day. Results were converted to metric tons per year. Because state highway VMT and associated emissions were based on average *weekday* traffic volumes, a 5-day to 7-day conversion factor was obtained from Caltrans and applied to the output to allow for annualizing.[32] Methane emissions were converted to carbon dioxide equivalent units based on the Global Warming Potential factor from LGOP.

Overall, in 2005, the estimated daily vehicle population on state and local roads was 39,573 vehicles. Those vehicles made approximately 268,215 daily trips on state and local roads. Daily VMT was approximately 1,522,798 and annual VMT totaled 555,821,264.

E.4.2 Off-road Mobile Sources

Off-road emissions were obtained from the ARB OFFROAD2007 model. The model was run using default equipment population, usage, and efficiency data for San Diego County. Emissions outputs were scaled to the local

32 Provided by Kim Sturmer, Caltrans. The recommended 5-day to 7-day factor (only available) for state highways is 0.948.

jurisdiction level by population share. Results were converted from short tons per day to metric tons per year. Methane and nitrous oxide emissions were converted to carbon dioxide equivalent units based on the Global Warming Potential factors from LGOP.

E.5 Solid Waste

Emissions from solid waste were captured in two ways: emissions from landfills located in the jurisdiction in the base year ("landfill waste-in-place"), and future emissions from decomposition of waste generated in the local jurisdiction in the base year ("community-generated solid waste").

E.5.1 Landfill Waste-in-Place

Methane emissions were obtained from ARB, which utilized a First Order Decay Model (FOD) to estimate emissions from County waste disposal facilities.[33] The FOD incorporates data on waste disposal and facility conditions extending back several decades to calculate methane and carbon dioxide equivalent emissions. In one case (Bonsall Sanitary Landfill), data was not available from ARB, and a figure based on observed emissions was provided by San Diego County. Data was not available for several inactive facilities in unincorporated San Diego County that were closed prior to reporting regulations came into effect; emissions from these facilities were not reported.

E.5.2 Community-Generated Solid Waste

Community-generated solid waste emissions were calculated in CACP using waste disposal data obtained from the California Integrated Waste Management Board Disposal Reporting System, which records tonnages of municipal solid waste and alternative daily cover by local jurisdiction. Emissions were calculated using the same methodology as described in Appendix D for government-generated solid waste.

E.6 Wastewater

This inventory utilizes wastewater emissions estimates from the EPIC San Diego County inventory. EPIC obtained a per capita wastewater emissions estimate from ARB for 2005. This figure was reduced to account for biogas capture at regional wastewater facilities using gas capture data provided by the San Diego County Air Pollution Control District. For the purposes of this inventory, this per capita County-wide emissions rate was scaled to the local jurisdiction level by population share.

33 Provided by Larry Hunsaker, ARB, on November 27, 2007. This data is embedded in the community master data file provided to the local jurisdiction with this report.

Appendix F: Conducting a Monitoring Inventory

The purpose of this appendix is to assist the City of Vista's staff in conducting a monitoring inventory to measure progress against the baseline established in this inventory report. Conducting such an inventory represents milestone five of the Five- Milestone Process, and allows a local government to assess how well it is progressing toward achieving its emissions reduction targets.

This inventory was conducted by ICLEI in conjunction with John Conley, Director of Community Development at the City of Vista, who served as the lead data gathering coordinator for the inventory. To facilitate a monitoring inventory, ICLEI has documented all of the raw data, data sources, and calculation methods used in this inventory. Future inventories should seek to replicate or improve upon the data and methods used in this inventory. Wherever possible, however, ICLEI strongly recommends institutionalizing internal data collection in order to be able to meet the recommended methods outlined in LGOP.

F.1 ICLEI Tools for Local Governments

ICLEI has created a number of tools for Vista to use to assist in future monitoring inventories. These tools are designed to work in conjunction with LGOP, which is, and will remain, the primary reference document for conducting an emissions inventory. These tools include:

- A "master data sheet" that contains most or all of the raw data (including emails), data sources, emissions calculations, data templates, notes on inclusions and exclusions, and reporting tools (charts and graphs and the excel version of LGOP reporting tool).
- A copy of all electronic raw data, such as finance records or Excel spreadsheets.
- LGOP reporting tool (included in the master data sheet and in Appendix B) that has all activity data, emissions factors, and methods used to calculate emissions for this inventory.
- Sector-specific instructions that discuss the types of emissions, emissions calculations methods, and data required to calculate emissions from each sector, as well as instructions for using the data collection tools and calculators in the master data sheet.

- The appendices in this report include detailed methodologies for calculating emissions from Scope 3 employee commute and government-generated solid waste, as well as two versions of the employee commute survey.

It is also important to note that all ICLEI members receive on-demand technical assistance from their ICLEI liaison, which local staff should feel free to contact at any point during this process.

F.2 Relationship to Other San Diego Regional Climate Protection Initiative Inventories

While the emissions inventories for the 10 participating local governments were conducted simultaneously using the same tools, a local government operations inventory is based on data specific to each local government's operations. For this reason, data must be collected internally within each local government, and the availability of data (and thus emissions estimation methods) will vary between local governments.

That said, local governments in the San Diego Regional Climate Protection Initiative may benefit by cooperating during the re-inventorying process. For example, by coordinating inventories, they may be able to hire a team of interns to collectively perform the inventories – saving money in the process. In addition, local staff may be able to learn from each other during the process or conduct group training sessions if necessary. As a whole, the Climate Protection Initiative provides the basis for a continuing regional platform for climate actions, and ICLEI recommends taking advantage of this opportunity during all climate actions, including conducting future greenhouse gas emissions inventories.

F.3 Improving Emissions Estimates

One of the benefits of a local government operations inventory is that local government staff can identify areas in their current data collection systems where data collection can be improved. For example, a local government may not directly track fuel consumption by each vehicle and instead will rely upon estimates based upon VMT or purchased fuel to calculate emissions. This affects both the accuracy of the emissions estimate and may have other implications for government operations as a whole.

During the inventory process, ICLEI and local government staff identified the following gaps in data that, if resolved, would allow the City of Vista to meet the recommended methods outlined in LGOP in future inventories.

- Direct tracking of refrigerants recharged into HVAC and refrigeration equipment
- Direct tracking of fire suppressants recharged into fire suppression equipment
- Fuel consumption by individual vehicles
- Odometer readings of individual vehicles
- Fuel consumption by mobile equipment

- Fuel consumption by diesel and other generators
- Direct tracking of refrigerants recharged into vehicles in the vehicle fleet
- Waste generated from government facilities

ICLEI encourages staff to review the areas of missing data and establish data collection systems for this data as part of normal operations. In this way, when staff are ready to re-inventory for a future year, they will have the proper data to make a more accurate emissions estimate.

F.4 Conducting the Inventory

ICLEI recommends the following approach for San Diego Regional Climate Protection Initiative local governments that wish to conduct a monitoring inventory:

Step 1: Identify a Climate Steward

This steward will be responsible for the jurisdiction's climate actions as a whole and could serve as an ICLEI liaison in all future climate work. In the context of a monitoring inventory, the steward will be responsible for initiating discussions on a new inventory.

Step 2: Determine which Sectors to Inventory

There are many ways to determine which sectors apply to a local government's operations, but the easiest to review will be LGOP Standard Report, which is located both in Appendix B and in the master data sheet. This document clearly delineates which sectors will need to be inventoried within a local government's operations and which LGOP sectors do not apply to a jurisdiction.

Step 3: Gather Support: Identify Data Gathering Team and Leads

Coordination and acceptance among all participating departments is an important factor in coordinating a successful inventory. To that end, the inventory coordinator should work with the city/town/county administrator to identify all staff who will need to be part of the inventory. To facilitate this process, ICLEI has documented all people associated with the inventory in the master data sheet—these names are located in the final completed data form for each sector. Once this team has been identified, the inventory coordinator should hold a kickoff meeting with the administrator, all necessary staff, and relevant department heads which clearly communicates the priority of the inventory in relationship to competing demands. At this meeting, the roles of each person, including the inventory coordinator, should be established.

Step 4: Review Types of Emissions and Available Methodologies for Applicable Sectors

Local staff should then review LGOP and the instructions documents provided through this inventory to better understand the types of emissions for each sector (for example, within Mobile Emissions, CO_2 emissions and

CH_4/N_2O emissions represent two different data requirements and emissions calculations methodologies). Each emissions type may have more than one possible estimation methodology, and it is important that the inventory coordinator understands all possible methodologies and be able to communicate this to all parties assisting in the data gathering.

Step 5: Review Methodologies Used for the 2005 Inventory to Determine Data to Collect

In order to duplicate or improve upon the methods used in this inventory, local staff should again review the methods used for this inventory—these methods are again located in Appendix B—and within the master data sheet. These methods reflect the data limitations for each local government (as many local governments could not obtain data necessary to meet the recommended methods in LGOP). Wherever possible, these methods should be duplicated or, if it is possible, replaced with the recommended methods outlined in LGOP. Using these methodologies, staff will determine what data needs to be collected and communicate this effectively to the data gathering team.

Step 6: Begin Data Collection

With the exception of electricity and natural gas for stationary sources, all data collection will be internal. To obtain stationary source energy consumption data, staff will need to contact the ICLEI representative to determine who the contact is for PG&E data (other utilities will need to be contacted directly).

Step 7: Use the Data Forms as a Resource During Data Gathering

A number of questions will come up during the data gathering process that may be difficult to answer. ICLEI has attempted to capture all of the questions that arose during the 2005 inventory and how they were addressed through the master data sheet. Within the master data sheet, staff should review the raw data, working data, and completed data forms to review how raw data was converted to final data, and also to review any notes taken by ICLEI staff during the 2005 inventory process.

For example, reviewing the stationary sources PG&E data within the master data sheet will allow local staff to review how individual accounts were separated into each category and which counts may have been excluded from the inventory.

Step 8: Use Emissions Software to Calculate Emissions

ICLEI has provided the staff lead on the 2005 inventory with a backup of the software used to calculate many of the emissions included in this report. Staff should use this (or more current ICLEI software) to calculate emissions by inputting the activity data into the software. ICLEI staff and ICLEI trainings are available to assist local government staff in calculating emissions.

Step 9: Report Emissions

The master data sheet also contains the LGOP Standard Reporting Template, which is the template adopted by ARB as the official reporting template for government operations emissions inventory. This tool, as well as the charts and graphs tool provided by ICLEI can be used to report emissions from government operations. Also, local government staff should utilize this narrative report as guide for a narrative report if they so choose.

Step 10: Standardize and Compare to Base Year

Conducting a monitoring inventory is meant to serve as a measuring point against the baseline year represented in this report. In order to make a more accurate comparison, it is necessary to standardize emissions from stationary sources based upon heating and cooling degree days (staff can use a ratio of heating /cooling degree days to standardize across years).

In addition, it is important, when comparing emissions across years, to clearly understand where emissions levels may have changed due to a change in methodology or due to excluding an emissions source. For example, if the default method was used to estimate refrigerant leakage in 2005 (this method highly overestimates these emissions), and the recommended method was available in a monitoring year, this would appear as a dramatic reduction in these emissions even though actual leaked refrigerants may be similar to the base year. Changes such as these should not be seen as progress toward or away from an emissions reduction target, but emissions estimates should be adjusted to create as much of an apples-to-apples comparison as possible. If such an adjustment is not possible, staff should clearly note the change in methodology between years when comparing emissions.

APPENDIX B

GHG REDUCTION TECHNICAL APPENDIX

Appendix B: GHG Reduction Technical Appendix

This appendix outlines the assumptions, sources, and parameters used to estimate the GHG emission reduction potential for each measure identified in Chapter 3, *Climate Action Measures*. The local reductions anticipated to occur from state-level regulations are explained at the end of this appendix.

Table B-1: Technical Assumptions for GHG Reductions from Local Measures

Measure	2020 GHG Reduction (MT CO_2e)	Performance Criteria	Assumptions
Municipal Operations			
Measure M-1: CAP Implementation	N/A	CAP Coordinator and CAP Implementation Team established and one City staff training within one year of CAP adoption; CAP Implementation Team meetings held annually through 2020	This measure would not directly reduce GHG emissions.
Measure M-2: Energy Efficient Lighting	334	80% of street and traffic lights replaced by 2020 (3,174 lights); Vista Energy Roadmap outdoor lighting project completed by 2020.	In 2005, Vista's 3,968 street and traffic signal lights used a total of 2,637,493 kilowatt hours (kWh) of electricity, producing approximately 659 metric tons CO_2e. This measure assumes 80% of street lights and traffic signal lights (3,174 lights) would be replaced with 50% more efficient lights by 2020, resulting in a reduction of 1,054,997 kWh per year and 264 MT CO_2e per year. In addition, the City of Vista Energy Roadmap identifies other outdoor lighting projects at City buildings and facilities that would reduce electricity consumption by 212,866 kWh per year and GHG emissions by 70 MT CO_2e per year. (Sources: City of Vista Greenhouse Gas Emissions Inventory, 2009; California Air Pollution Control Officers Association [CAPCOA], 2010; California Lighting Technology Center and University of California, Davis, The State of Street Lighting in California, 2012: A Study of Public Infrastructure & Energy Use in California, 2012.)
Measure M-3: Renewable Energy	77	150 kilowatts of solar installed by 2020	150 kW installed by 2020, producing 224,125 kWh of electricity annually. (Source: National Renewable Energy Laboratory, http://www.nrel.gov/rredc/pvwatts/)

Measure	2020 GHG Reduction (MT CO_2e)	Performance Criteria	Assumptions
Measure M-4: Employee Commute Alternatives	56	5% reduction in City employee commute VMT by 2020	In 2005, VMT for City employee commutes totaled 2,175,205 miles. A 5% reduction would bring employee commute VMT to 2,066,445 by 2020. (Source: City of Vista Greenhouse Gas Emissions Inventory, 2009)
Measure M-5: Municipal Recycling	22	10% reduction in waste generated by City facilities by 2020	In 2005, municipal facilities and operations generated 448 tons of solid waste. A 10% reduction would bring municipal landfilled solid waste to 403 tons in 2020. (Source: City of Vista Greenhouse Gas Emissions Inventory, 2009)
Energy			
Measure E-1: Energy Efficiency Building Standards	3,994	100% of new development complies with Title 24, Part 6 , Building Energy Efficiency Standards and Part 11, the CALGreen Code, as amended	The 2020 forecast assumes that the growth in emissions from natural gas and electricity in the residential and commercial/industrial sectors (7,114 MT CO_2e) is from new construction. This calculation assumes that all new construction meets the 2008 Title 24, Part 6 minimum efficiency standards and 47% of new construction (development in years 2014-2020) meets the 2013 Title 24, Part 6 minimum efficiency standards. 2008 Title 24, Part 6 standards exceed the 2005 Title 24, Part 6 standards (which were used in the 2020 forecast) by approximately 10% for residential construction and 5% for commercial construction. 2013 Title 24, Part 6, energy efficiency standards exceed the 2008 Title 24, Part 6 standards by approximately 25% for residential construction and 30% for commercial construction. Applied to the percent of residential and commercial energy covered by Title 24 standards (32.8% of residential electricity covered, 85.7% of residential natural gas covered, 64% of commercial electricity covered, and 70% of commercial natural gas covered). (Sources: City of Vista Greenhouse Gas Emissions Inventory; Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings; California Energy Commission 2013 Title 24 Building Energy Efficiency Standards http://www.energy.ca.gov/releases/2012_releases/2012-05-31_energy_commission_approves_more_efficient_buildings_nr.html; Statewide Energy Efficiency Collaborative, Greenhouse Gas Forecasting Assistant, October 2011)

Measure	2020 GHG Reduction (MT CO_2e)	Performance Criteria	Assumptions
Measure E-2: Energy Efficiency in Existing Buildings	4,461	15% of existing buildings implement energy efficiency improvements, with an average efficiency improvement of 15% by 2020 (equivalent to a 2.3% total reduction in electricity and natural gas consumption).	15% of 2005 baseline residential, commercial, and industrial buildings implement efficiency improvements that reduce energy consumption by 15% (equivalent to a 2.3% total reduction in electricity and natural gas consumption from the 2005 baseline). (Sources: City of Vista Greenhouse Gas Emissions Inventory; California Statewide Residential and Commercial Sector Energy Efficiency Potential Studies, 2003, Study ID#: SW063 and #SW039A, Prepared for Pacific Gas & Electric by KEMA-XENERGY, Inc.; CAPCOA, 2010)
Measure E-3: Smart Meters	3,629	3.7% reduction in residential electricity consumption; 2.3% reduction in non-residential electricity consumption by 2020.	Studies show a 9.2% average annual electricity savings when direct real-time feedback is provided, which was applied to 45% of households and 25% of commercial/industrial buildings. This equates to a 3.7% reduction in residential electricity consumption and a 2.3% reduction in commercial/ industrial electricity consumption by 2020. Additional electricity savings (2.8%) are shown to be achieved through the installation of Smart Grid appliances that can be pre-programmed to run at off-peak energy times (this additional reduction is not included in the GHG reduction potential). (Source: Ehrhardt-Martinez, K.; Donnely, K; and J. Latiner. 2010. Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Electricity-Savings Opportunities. Washington, D.C.: American Council for an Energy-Efficient Economy)

Measure	2020 GHG Reduction (MT CO_2e)	Performance Criteria	Assumptions
Measure E-4: Small-Scale Renewable Energy Installations	3,712	4,690 kilowatts of solar installed by 2020; 907 solar hot water heaters installed by 2020	According to California Solar Initiative, approximately 2,112 kW solar photovoltaic (PV) systems were installed on 391 residential properties and 702 kW of solar PV systems were installed on commercial properties over a 6 year period, for a combined total of 2,814 kW over 6 years, or 469 kW per year. Assumes funding available for 10 years for a total of 4,690 kW installed. Annual energy production of 8,911,000 kWh. Reduction: 3,056 MT CO2e. Assumes 3% of households (907) by 2020 install a solar hot water heater. Annual electricity savings of 885,009 kWh and annual natural gas savings of 63,038 therms. GHG reduction: 656 MT CO2e. Participation based on participation in energy efficiency financing and rebate programs of existing programs. (Sources: California Solar Initiative website, Geographical Statistics, 2012; CEC, 2010, New Solar Homes Partnership, Third Edition. Sacramento: CEC; National Resources Defense Council; PACE Now; Renewable Funding, LLC; The Vote Solar Initiative, 2010, Property Assessed Clean Energy Programs White Paper; ICLEI's Climate and Air Pollution Planning Assistant [CAPPA] tool, 2009)
Measure E-5: Tree Planting and Urban Forests	126	500 trees planted by 2020	500 trees planted between 2005 and 2020, each sequestering approximately 0.252 MT CO_2e. (Source: CAPPA, 2009)
Transportation and Land Use			
Measure T-1: Bicycle and Pedestrian Travel	1,745	2% mode shift from single-occupant vehicle to walking and biking	2% of weekly car trips made on local roads (23,343 trips) switch to bicycle and another 2% (23,343 trips) switch to walking by 2020. For bicycle trips, the average length of trip avoided is assumed to be 2 miles and the average fuel economy is assumed to be 19.7 miles per gallon (mpg) This results in a 0.4% reduction in VMT (or 2,427,672 annual VMT) from bicycle trips and an annual gasoline savings of 123,232 gallons. For pedestrian trips, the average length of the trip avoided is assumed to be 1 mile and average fuel economy is assumed to be 19.7 mpg. This is equivalent to a 0.2% reduction in VMT (or 1,213,836 annual VMT) and an annual gasoline savings of 61,616 gallons. (Source: CAPPA, 2009)

Measure	2020 GHG Reduction (MT CO_2e)	Performance Criteria	Assumptions
Measure T-2: Transit Travel	1,912	2% mode shift from single-occupant vehicles to transit	Assumes 2% of weekly car trips switch to transit. Assumes an average trip length of 7 miles and an average passenger vehicle fuel economy of 19.7 mpg. (Source: SANDAG 2006 San Diego Household Travel Survey)
Measure T-3: Commute Trip Reduction	2,420	1% mode shift from single-occupant vehicle to carpool or vanpool; 1% reduction in commute trips from telecommuting	1.5% of employees in Vista (671 employees) participate in a carpool and 1.5% of employees in Vista (671 employees) telecommute. Assumes an average trip length of 11.8 miles and an average passenger vehicle fuel economy of 19.7 mpg. (Source: SANDAG 2006 San Diego Household Travel Survey)
Measure T-4: Smart Growth	4,962	5% of households located in mixed-use or transit-oriented development by 2020	Assumes that by 2020 5% of households (1,512 households) would be located in mixed use or high-density development within 1/2 mile of transit. For these households, a 45% reduction in annual VMT is assumed, equivalent to 2,662 VMT. An average passenger fuel economy of 19.7 mpg is also assumed. (Source: CAPPA, 2009).
Solid Waste			
Measure S-1: Expanded Recycling	2,711	95% of multi-family residences and commercial operations with access to recycling	30% increase in diversion of paper products and plant debris from the waste stream, which represents approximately 28% of the community's solid waste stream. (Source: City of Vista Greenhouse Gas Emissions Inventory, 2009).
Measure S-2: Construction and Demolition Debris Diversion	1,872	100% compliance	50% diversion of construction and demolition debris. According to the California 2008 Statewide waste Characterization Study, which was used to inform the City's GHG Emissions Inventory, construction and demolition debris makes up 29% of the waste stream and 40% of that is non-hazardous and recyclable.
Community Education and Outreach			
Measure C-1: Community Education and Outreach	Supporting Measure	2 webpage updates per year; City newsletter issued three times per year with content to educate and engage Vista community members	Supporting measure. Contributes to the GHG reduction potentials of other CAP measures.

Table B-2: Technical Assumptions for GHG Reductions from State Measures

Measure	2020 GHG Reduction (MT CO_2e)	Assumptions
State-Level		
AB 1493 (Pavley)	52,328	Calculated using EMFAC Pavley I + LCFS Postprocessor (version 1.0).
Low Carbon Fuel Standard (LCFS)	25,262	Calculated using EMFAC Pavley I + LCFS Postprocessor (version 1.0).
Passenger Vehicle Efficiency	10,078	The Scoping Plan estimates that this would result in a 2.8% reduction in GHG emissions from passenger vehicles compared to 2020 business-as-usual conditions.
Heavy-Duty Vehicle Efficiency	8,421	The Scoping Plan estimates that this measure would result in a 2.9% reduction in GHG emissions from heavy and medium vehicles compared to 2020 business-as-usual conditions.
Renewable Portfolio Standard	37,698	SDG&E must have a renewable portfolio of 33% by 2020; in 2005 it was 5.5%; therefore, an additional 27.5% reduction from residential, commercial, and industrial electricity consumption can be expected by 2020.

Accounting for State-level Measures

The AB 32 Scoping Plan identifies several adopted State regulations or measures that will reduce GHG emissions within Vista. These State measures require no additional local action. They were not accounted for in the State of California's or Vista's "business-as-usual"[1] emissions inventories or forecasts; therefore, the CAP assumes credit for the portion of these statewide emissions reductions that would occur within the City. Additional details regarding the methods used to calculate the GHG reductions from State measures is provided below, along with an explanation of why the assumptions in Appendix B are reasonable and/or conservative are provided in the table below.

Table B-2: Technical Assumptions for GHG Reductions from State Measures

Measure	2020 GHG Reduction (MT CO_2e)	Assumptions
State-Level		
AB 1493 (Pavley I only)	52,328	Calculated using EMFAC Pavley I + LCFS Postprocessor (version 1.0). Please see the User's Guide for this tool for calculation methodology details and all assumptions, available at: http://www.arb.ca.gov/cc/sb375/tools/pavleylcfs-userguide.pdf.

[1] Business-as-usual emissions are projected in the absence of any policies or actions that would reduce emissions.

Measure	2020 GHG Reduction (MT CO_2e)	Assumptions
		Quantification of the 2020 reduction from Pavley I (affecting vehicle model years 2009 to 2016) is reasonable because it was calculated following a methodology and using a tool and assumptions set forth by the California Air Resources Board. It is conservative because it only accounts for Pavley I. It does not account for the California Advanced Clean Cars rule (affecting vehicle model years 2017 to 2025), which was approved by the California Air Resources Board and U.S. EPA in January 2012, as it had not yet been incorporated into the State's EMFAC tools.
Low Carbon Fuel Standard (LCFS)	25,262	Calculated using EMFAC Pavley I + LCFS Postprocessor (version 1.0). Only accounts for Pavley I. Please see the User's Guide for this tool for calculation methodology details and all assumptions, available at: http://www.arb.ca.gov/cc/sb375/tools/pavleylcfs-userguide.pdf. Quantification of the 2020 reduction from the LCFS is reasonable because it was calculated following a methodology and using a tool and assumptions set forth by the California Air Resources Board.
Passenger Vehicle Efficiency	10,078	The AB 32 Scoping Plan identified several early action items that would reduce GHG emissions from passenger vehicles by increasing vehicle efficiency through proper tire inflation and solar-reflective automotive paint requirements (see Scoping Plan page 51). The Scoping Plan estimates that this would result in a 4.5 million metric tons (MMT) CO2e reduction in statewide GHG emissions from passenger vehicles compared to 2020 business-as-usual conditions (see Scoping Plan page 52). The State's GHG emissions forecast used in preparing the Scoping Plan identify 2020 business-as-usual emissions from passenger vehicles as 160.78 MMT CO2e. This equates to a 2.8% reduction in statewide 2020 business-as-usual emissions from passenger vehicles. A 2.8% reduction was therefore applied to Vista's 2020 business-as-usual GHG emissions from passenger vehicles, which is equal to 10,078 MT CO2e.
Heavy-Duty Vehicle Efficiency	8,421	This Scoping Plan measure identifies requirements for trucks and trailer to be retrofitted with the best available technology and/or CARB-approved technology. This measure is expected to result in a 2.9 percent (or 1.4 MMT CO2e) reduction in GHG emissions from heavy- and medium-vehicles compared to the

Measure	2020 GHG Reduction (MT CO_2e)	Assumptions
		State's 2020 business-as-usual forecast (48.28 MMT CO2e) used in developing the Scoping Plan (see Scoping Plan page 53). A 2.9% reduction was therefore applied to Vista's 2020 business-as-usual GHG emissions from heavy/medium-duty vehicles.
Renewable Portfolio Standard	37,698	The Renewable Portfolio Standard requires investor owned utilities, including SDG&E, to have a renewable portfolio of 33% by 2020. In 2005, SDG&E was at 5.5%[2] and its average grid electricity carbon dioxide emissions factor was 546.5 lbs/MWh (Source: California Climate Action Registry Power/Utility Protocol public reports, http://www.climateregistry.org/CARROT/public/reports.aspx). In 2020, based on a renewable portfolio of 33% SDG&E's carbon dioxide emissions factor is projected to be 383.6 lbs/MWh (Source: Energy + Environmental Economics, Greenhouse Gas Calculator for the California Electricity Sector, version 3c [October 2010], prepared for the California Public Utilities Commission). This emissions factor was applied to estimate the reduction in Vista's 2020 emissions from electricity usage. This equates to an approximate 29% reduction in carbon dioxide resulting from electricity usage and a 28% reduction in MT CO2e from electricity usage.

As noted in the table above, the Draft CAP does not take into account the California Advanced Clean Cars rule (affecting vehicle model years 2017 to 2025), which would further reduce Vista's GHG emissions. In addition, it does not account for reductions from the recently approved 2013 Title 24 California Building Energy Efficiency Standards, which would also further reduce Vista's GHG emissions.

It is important to note that Section 4.2, *Monitoring*, of the Draft CAP, identifies how the City will monitor and evaluate the individual measures in the CAP, as well as the plan as a whole. As stated in Section 4.2.2, "The City CAP Coordinator, in coordination with the CAP Implementation Team, will be responsible for initiating the inventory updates as well as reporting on the results and progress toward the target in the annual report to the City Council for that year. In addition, the report will include an assessment of the implementation of applicable AB 32 Scoping Plan measures [identified in the table above] to determine whether adjustments to the CAP must be made to account for any shortfalls in AB 32 Scoping Plan implementation" (page 4-13).

[2] By the end of 2012, SDG&E produced 20.31% of their electricity from renewables. (Renewable Portfolio Standard Quarterly Report, 1st Quarter 2013, page 3; available online at: http://www.cpuc.ca.gov/NR/rdonlyres/384E3432-6EAB-4492-BF88-992874A7B978/0/2013_Q1RPSReportFINAL.pdf)

It may also be worth noting that AB 32 targets the reduction of statewide emissions and that AB 32 does not specify that the emissions reductions should be achieved through uniform reduction by geographic location or by emission source characteristics.

APPENDIX C

COST AND SAVINGS ANALYSIS

Appendix C: Cost and Savings Analysis

Economics were a key consideration in determining the feasibility of proposed GHG reduction measures and actions. This appendix details the methodology, information sources, and assumptions for the cost and savings estimates included in the CAP. The cost and savings estimates are based on market research and represent the best available information at the time this CAP was developed. Costs are generally presented as first year costs and account for the expense that would occur beyond the cost of conducting business-as-usual (i.e., without implementation of the CAP). For each measure, potential costs and savings to the City and community (private costs/savings) are categorized as low, medium, and high. These categories correspond to a range, as shown in the table below, as costs for each measure are highly variable.

Table C-1: Measure Cost and Savings

Cost/Savings Type	Range	
City Cost/Savings	Low: Medium: High:	$0 - $10,000 $10,001 - $100,000 $100,001 or greater
Private Cost/Savings	Low: Medium: High:	$0 - $1,000 $1,001 - $5,000 $5,001 or greater

APPENDIX C: COST AND SAVINGS ANALYSIS

Measure	City Cost	City Savings	City Cost/Savings Discussion*	Private Cost	Private Savings	Private Cost/Savings Discussion
Municipal Operations (M)						
Measure M-1: CAP Implementation	Medium	None	TBD	None	None	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** None.
Measure M-2: Energy Efficient Lighting	Low	High	**CITY COSTS**: Upfront costs include staff time to obtain grant funding (approximately 30 hours, at $50-$100/hour = $1,500-$3,000). It is assumed that the lights and installation would be funded through a grant or utility program. **CITY SAVINGS**: Approximately $201,131 based on a 50% reduction in 80% of public lighting electricity costs (based on 2005 cost data). This does not account for savings from reduction in maintenance, which would also result. (Source: City of Vista GHG Emissions Inventory, 2009)	None	None	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** None.
Measure M-3: Renewable Energy	Low	Medium	**CITY COSTS**: Minimal additional time from City staff would be required to secure grant funding (approximately 20 hours, or $1,000-$2,000). It is assumed that any additional systems would be funded by grant monies. **CITY SAVINGS:** Approximately $35,860-$45,443 in annual savings based on 150 kW installed. (Source: National Renewable Energy Laboratory, PV Watts Calculator, http://www.nrel.gov/rredc/pvwatts/)	None	None	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** None.
Measure M-4: Employee Commute Alternatives	Low	Low	**CITY COSTS:** Costs would include City staff time to develop and implement a commuter benefit program (approximately 20 hours, or $1,000-$2,000). Bicycle parking was already installed at the Vista Civic Center in 2010. **CITY SAVINGS:** No direct savings for the City, although employees would save on commute costs, and potential benefits through the program, such as transit pass discounts.	None	None	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** None.

Measure	City Cost	City Savings	City Cost/Savings Discussion*	Private Cost	Private Savings	Private Cost/Savings Discussion
Measure M-5: Municipal Recycling	Low	None	**CITY COSTS:** This measure would require approximately 40 hours of staff time to identify locations needing receptacles and to purchase and install the receptacles (approximately $2,000 - $4,000). The average cost of a commercial recycling receptacle is $500. If 10 were purchased, the cost would be $5,000. Ongoing costs associated with maintenance would be approximately $500/year. **CITY SAVINGS:** None.	None	None	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** None.
Energy (E)						
Measure E-1: Energy Efficiency Building Standards	None	None	**CITY COSTS:** Title 24, Part 6, 2008 Building Energy Efficiency Standards were adopted in 2008. Title 24, Part 11, the CALGreen Code was adopted in 2010 and became effective January 1, 2011. Title 24, Part 6, 2013 Building Energy Efficiency Standards will go into effect January 1, 2014. This is a cost associated with doing business-as-usual as it is required under state law. **CITY SAVINGS:** None.	None	None	**PRIVATE COSTS:** Title 24, Part 6, 2008 Building Energy Efficiency Standards were adopted in 2008. Title 24, Part 11, the CALGreen Code was adopted in 2010 and became effective January 1, 2011. Title 24, Part 6, 2013 Building Energy Efficiency Standards will go into effect January 1, 2014. This is a cost associated with doing business-as-usual as it is required under state law. **PRIVATE SAVINGS:** None
Measure E-2: Energy Efficiency in Existing Buildings	Low	None	**CITY COSTS:** Annual costs are associated with City staff time needed to collaborate with local energy suppliers (approximately 20 hours annually, or $1,000-$2,000 per year). Program costs would be borne by existing programs through the federal and state governments and SDG&E. Costs associated with community education and outreach related to this measure are accounted for under Measure C-1. **CITY SAVINGS:** None.	Low to High	Low to High	**PRIVATE COSTS:** No mandatory costs, as this is a voluntary measure. For participating residents and businesses, costs will vary based on the degree of implementation and available rebates and other financial incentives. The *incremental cost* of replacing older, less efficient appliances and technologies with an ENERGY STAR product is as follows: computer $0, printer $0, refrigerator $30, vending machine $0, water cooler $0, dish washer $0, clothes washer $150, light bulb $2, exit sign $39, water heater $910, boiler $0.36/sq ft, chiller $0.36/sq ft. In regards to retrofits, costs will vary based on the size, age, condition, and design of the building and site. For a

Measure	City Cost	City Savings	City Cost/Savings Discussion*	Private Cost	Private Savings	Private Cost/Savings Discussion
						representative 2,000 sq ft house, the initial capital cost of implementing basic, cost-effective energy conservation measures, which achieve an average of 15% energy efficiency improvement, would be $1,000 - $1,500, or $0.50 - $0.75/sq ft. These improvements include attic and duct insulation, high efficiency heating system, low-flow plumbing fixtures, and high efficiency lighting. For a 10,000 sq ft commercial building, the initial cost of implementing basic cost-effective energy efficiency measures to achieve ~20% energy efficiency improvements would be $40,000 - $100,000, or $4- $10/sq ft. These measures include: high efficiency heating and cooling system, variable frequency drives, high efficiency lighting systems, lighting controls, low flow fixtures, and high efficiency hot water boiler. The owner could leverage additional rebate/financing options to offset some costs. **PRIVATE SAVINGS:** The average annual savings of installing energy efficient appliances and technologies is as follows: computer $36, printer $30, refrigerator $30, vending machine $275, water cooler $34, dish washer $30, clothes washer $90, light bulb $13, exit sign $119, water heater $249, boiler $0.01/sq ft, chiller $0.14/sq ft. The average annual savings for the residential retrofit example is $200-$300, or $0.10 - $0.15/sq ft and $5,000 - $15,000, or $0.50 - $1.50/sq ft for the commercial example. (Sources: ENERGY STAR Cost and Savings Calculators, www.energystar.gov; California Public Utilities Commission, SDG&E Gas and Electricity Rates, 2011; Yolo County Climate

Measure	City Cost	City Savings	City Cost/Savings Discussion*	Private Cost	Private Savings	Private Cost/Savings Discussion
						Action Plan, 2011; California Consumer Energy Center, www.consumerenergycenter.org;)
Measure E-3: Smart Meters	Low	None	**CITY COSTS:** Minimal costs associated with staff time to coordinate with SDG&E would result from this measure (4 hours, or $200-$400). Costs associated with community education and outreach related to this measure are accounted for under Measure C-1. **CITY SAVINGS:** None	None	Low	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** Based on utility rates and an assumed 9.2% savings in electricity, this measure would save residents and businesses approximately $100 annually. (Source: California Public Utilities Commission, SDG&E Gas and Electricity Rates, 2011)
Measure E-4: Small-Scale Renewable Energy Installations	Low	None	**CITY COSTS**: This measure would require approximately 20 hours ($1,000-$2,000) of City staff time to develop and adopt an incentive policy or program. Costs associated with community education and outreach related to this measure are accounted for under Measure C-1. **CITY SAVINGS**: None.	Medium to High	Low to Medium	**PRIVATE COSTS:** No mandatory costs, as this is a voluntary measure. The average cost of solar photovoltaic installation per kW without subsidies or financial assistance is $9,000. The average cost of a solar hot water heater is $3,000. The California Solar Initiative Program offers cash rebates of up to $1,875 for solar water heating systems on single-family homes. The California Solar Initiative also offers cash back for installing solar on your home or business, based on the power generation in the first five years (approximately $0.50 per kWh). **PRIVATE SAVINGS:** The average annual savings is $824 for a 3 kW solar photovoltaic system and $2,749 for a 10 kW system. The average annual savings is $250 for a solar hot water heater installed in a single-family home. (Sources: California Public Utilities Commission, SDG&E Gas and Electricity Rates, 2011; California Solar Initiative, Solar Calculators, http://www.gosolarcalifornia.org/)
Measure E-5: Tree Planting and Urban Forests	Low	Medium	**CITY COSTS**: This measure would require City staff time to apply for and obtain grant funding to prepare the plan and ordinance, and incorporate the ordinance into the Municipal Code (approximately 40 hours, or $2,000-$4,000). It is assumed that the plan and	None	Low	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** Indirect savings would be the same as for the City.

Measure	City Cost	City Savings	City Cost/Savings Discussion*	Private Cost	Private Savings	Private Cost/Savings Discussion
			ordinance would be funded through grants. **CITY SAVINGS:** Although the benefits of urban forestry can vary considerably by community and tree species, a study of urban forestry programs in five U.S. cities showed the benefits are almost always higher than the costs. The study found that, on a per-tree basis, the cities accrued benefits ranging from about $1.50-$3 for every dollar invested. These cities spent roughly $15-$65 annually per tree, with net annual benefits ranging from approximately $30-$90 per tree. By achieving energy savings from planted trees, it is anticipated that planting 500 trees citywide would save $18,360 in energy costs. (Source: McPherson, et al in USEPA, 2009)			
Transportation (T)						
Measure T-1: Bicycle and Pedestrian Travel	Low	None	**CITY COSTS:** Pursuing funds to expand the City's bicycle and pedestrian network is a cost associated with doing business-as-usual as City staff regularly does this. A number of projects are already underway and others are identified in the Capital Improvement Program. Minimal costs would occur as a result of incorporating multi-modal improvements into pavement resurfacing, restriping, and signalization operations (less than $5,000). There would be minimal additional costs associated with staff time needed for project review and approval processing; however, this cost will be absorbed through development/permitting fees. **CITY SAVINGS:** None. (Sources: National Complete Streets Coalition, http://www.completestreets.org/complete-streets-fundamentals/factsheets/costs/; Moving Cooler, October 2009).	None	Low to High	**PRIVATE COSTS**: Actions T-1.3 and T-1.4 would result in costs to project applicants; however, these are considered costs of doing business-as-usual as they are identified in General Plan 2030 (CE Policies 6.2, 6.5, 6.7, and 6.12; also refer to Appendix D) and bicycle parking standards are part of CALGreen that went into effect January 1, 2011. The following is provided for informational purposes: Cost of infrastructure development is highly variable. Cost estimates for bicycle infrastructure: Class I Bike Path - approximately $1,000,000 per mile; Class II Bike Lanes - $10,000 - $1,000,000 per mile (depending on level of roadway improvement required); Class III Bike Routes - $2,000 - $60,000 per mile (depending on the level of treatment; route signage only would be lower end, signage and shoulder striping, pavement markings, signal actuation would be higher

Measure	City Cost	City Savings	City Cost/Savings Discussion*	Private Cost	Private Savings	Private Cost/Savings Discussion
						end). The cost per mile of sidewalk is approximately $250,000. **PRIVATE SAVINGS**: Switching from single-occupant vehicle to walking or biking reduces fuel and vehicle costs. The cost to own and operate a medium-sized car is approximately $8,500 per year, and the cost of operation alone is $0.56 per mile. Private savings would range from low to high depending on the individual reduction in VMT. (Sources: Moving Cooler, October 2009; Alta Planning, 2011; American Automobile Association; IRS, January 2011).
Measure T-2: Transit Travel	Low	None	**CITY COSTS:** This measure would result in costs associated with coordination with NCTD and SANDAG, and studying and removing barriers to public transit, for example, by implementing Safe Routes to Transit programs (approximately 80 hours, or $4,000-$8,000). In addition, this measure would require minimal additional City staff time needed for project review and approval processing; however, this cost would be absorbed through development/permitting fees. It is assumed that projects to remove barriers would be paid for by grant funding. **CITY SAVINGS:** None.	None	Low to High	**PRIVATE COSTS:** Action T-2.5 would result in costs to project applicants; however, this is considered the cost of doing business-as-usual as it is identified in General Plan 2030 (CE Policy 5.4). The following is provided for informational purposes: The cost of providing a bus turnout and shelter is variable depending on the existing conditions, size, and level of implementation. NCTD estimated design and construction of a bus turnout lane, which adds a short auxiliary lane for safe parking of buses and standard transit bus stop components consistent with NCTD's standard bus stop amenities, to be $122,699. **PRIVATE SAVINGS**: This measure would encourage people to utilize public transportation and would reduce VMT and associated fuel and vehicle costs to community members. The cost to own and operate a medium-sized car is approximately $8,500 per year, and the cost of operation alone is $0.56 per mile. Private savings would range from low

Measure	City Cost	City Savings	City Cost/Savings Discussion*	Private Cost	Private Savings	Private Cost/Savings Discussion
						to high depending on the individual reduction in VMT. (Sources: NCTD Schedule of Approved Projects, www.gonctd.com/pdf…/ARRA%20sch%20of%20approved%20projects.pdf; American Automobile Association; IRS, June 2011).
Measure T-3: Commute Trip Reduction	Low	None	**CITY COSTS:** This measure would result in costs associated with City staff time required to coordinate with local business support groups to promote trip reduction programs (approximately 20 hours, or $1,000-$2,000). Costs associated with community education and outreach related to this measure are accounted for under Measure C-1. **CITY SAVINGS:** None.	None	Low to High	**PRIVATE COSTS:** None. **PRIVATE SAVINGS**: This measure would encourage people to commute via modes other than single occupancy vehicles. This would reduce fuel and vehicle costs for community members. The cost to own and operate a medium-sized car is approximately $8,500 per year, and the cost of operation alone is $0.56 per mile. Private savings would range from low to high depending on the individual VMT reduction. (Sources: American Automobile Association; IRS, June 2011).
Measure T-4: Smart Growth	Low	None	**CITY COSTS:** The update to the Zoning Code would be included as part of the General Plan Update process, following its adoption. Costs for incentives would vary based on the degree of incentives provided; additional time for City staff to determine incentives is estimated at approximately 20 hours, or $1,000 - $2,000. Costs from this measure would also be associated with City staff time needed to coordinate with SANDAG to update the Smart Growth Map (approximately 4 hours, or $200-$400). **CITY SAVINGS:** None.	None	Low to High	**PRIVATE COSTS:** None. **PRIVATE SAVINGS**: The savings for project applicants would vary based on incentives provided, ranging from low to high. Reductions in per capita vehicle travel would reduce direct and indirect transportation costs. Private savings would range from low to high depending on the individual reduction in VMT.
Solid Waste (S)						
Measure S-1: Expanded Recycling	None	None	**CITY COSTS:** AB 341 (California's Mandatory Commercial Recycling Law), adopted in January 2012, sets forth the requirements of the	None to Low	None	**PRIVATE COSTS**: AB 341 (California's Mandatory Commercial Recycling Law), adopted in January 2012, sets forth the

Measure	City Cost	City Savings	City Cost/Savings Discussion*	Private Cost	Private Savings	Private Cost/Savings Discussion
			statewide mandatory commercial and multi-family residential recycling program, which becomes effective July 1, 2012. This is now a cost associated with doing business-as-usual as it is required under state law. **CITY SAVINGS:** None.			requirements of the statewide mandatory commercial and multi-family residential recycling program, which becomes effective July 1, 2012. This is now a cost associated with doing business-as-usual as it is required under state law. **PRIVATE SAVINGS:** None.
Measure S-2: Construction and Demolition Debris Diversion	None	None	**CITY COSTS**: The City's Construction and Demolition Debris Diversion requirements were adopted in 2006 and updated in 2011. This is a cost associated with doing business-as-usual. **CITY SAVINGS:** None.	None	None	**PRIVATE COSTS:** The City's Construction and Demolition Debris Diversion requirements were adopted in 2006 and updated in 2011. This is a cost associated with doing business-as-usual. **PRIVATE SAVINGS:** None.
Community Education and Outreach (C)						
Measure C-1: Community Education and Outreach	Low	None	**CITY COSTS:** This measure would result in costs associated with staff time to conduct public education and outreach associated with the CAP and CAP measures (approximately 80 hours, or $4,000-$8,000). **CITY SAVINGS:** None.	None	None	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** This measure would not result in direct savings to community members, but may result in indirect savings due to actions taken based on education and outreach efforts.
Adaptation (A)						
Measure A-1: Climate Change Vulnerability	Low	None	**CITY COSTS:** This measure would result in costs associated with staff time to participate in meetings and planning activities and incorporate new adaptation measures into City documents as appropriate (approximately 20 hours, or $1,000-$2,000). **CITY SAVINGS:** None.	None	None	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** None.
Measure A-2: Public Health and Safety	Low	None	**CITY COSTS:** This measure would result in costs associated with staff time to coordinate with other agencies and community-based organizations (approximately 20 hours, or $1,000-$2,000). **CITY SAVINGS:** None.	None	None	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** None.
Measure A-3: Water	None	None	**CITY COSTS:** None.	None	None	**PRIVATE COSTS:** None.

APPENDIX C: COST AND SAVINGS ANALYSIS

Measure	City Cost	City Savings	City Cost/Savings Discussion*	Private Cost	Private Savings	Private Cost/Savings Discussion
Resources			**CITY SAVINGS:** None.			**PRIVATE SAVINGS:** None.
Measure A-4: Biodiversity and Habitats	None	None	**CITY COSTS:** None. **CITY SAVINGS:** None.	None	None	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** None.
Measure A-5: Energy Supply	None	None	**CITY COSTS:** None. **CITY SAVINGS:** None.	None	None	**PRIVATE COSTS:** None. **PRIVATE SAVINGS:** None.

*City costs are calculated based on a rate of $50-$100 per hour.

APPENDIX D

GENERAL PLAN 2030 POLICY CONSISTENCY

Appendix D: General Plan 2030 Policy Consistency

The CAP measures and actions incorporate and build on many of the General Plan 2030 goals and policies. This appendix lists the goals and policies of General Plan 2030 as they relate to each CAP measure identified in Chapter 3, *Climate Action Measures*.

Measure	General Plan 2030 Goal/Policy
Municipal Operations (M)	
Measure M-1: CAP Implementation	**RCS Policy 2.2:** Update the City's *Greenhouse Gas Emissions Inventory* periodically to incorporate improved methods, better data, and/or more accurate tools and methods, and to assess progress. **RCS Policy 14.9:** Implement a training program for City staff to support the City's goal of reducing GHG emissions from municipal facilities and operations, including energy efficiency training to engineering, building operations, and facility maintenance staff; and energy conservation for all City employees.
Measure M-2: Energy Efficient Lighting	**RCS Goal 14:** Promote efficient and sustainable use of energy resources through conservation, demand-reduction activities, and alternative energy sources. **RCS Policy 14.1:** Consider the goals and policies in SANDAG's Regional Energy Strategy in drafting new legislation, policies, or procedures. **RCS Policy 14.6(d):** Prepare and implement a comprehensive plan to improve the energy efficiency of municipal facilities and conserve electricity and natural gas, including installing energy-efficient exit signs, street signs, and traffic lighting.
Measure M-3: Renewable Energy	**RCS Goal 14:** Promote efficient and sustainable use of energy resources through conservation, demand-reduction activities, and alternative energy sources. **RCS Policy 14.1:** Consider the goals and policies in SANDAG's Regional Energy Strategy in drafting new legislation, policies, or procedures.
Measure M-4: Employee Commute Alternatives	**RCS Policy 2.8:** Implement new or enhance existing measures to reduce employee vehicle trips and mitigate emissions impacts from business-related travel to reduce GHG emissions.
Measure M-5: Municipal Recycling	**RCS Policy 9.9:** Build and maintain parks, recreation, and community facilities in an environmentally sustainable manner. Examples include: (g) providing recycling bins for park users. **RCS Goal 15:** Reduce the amount of solid waste generated and diverted to landfills. **RCS Policy 15.6:** Increase asphalt recycling and the use of recycled asphalt and cement in the new development, rehabilitation, or reconstruction of public facilities.
Energy (E)	
Measure E-1: Energy Efficiency Building Standards	**LUCI Policy 4.9:** Ensure that new development complies with the California Green Building Standards Code (the CALGreen Code) to promote sustainable design and construction practices and positive environmental impacts in planning and design, energy efficiency, water efficiency and conservation, and

Measure	General Plan 2030 Goal/Policy
	material conservation and resource efficiency. **RCS Policy 14.10:** Encourage adherence to the California Green Building Code.
Measure E-2: Energy Efficiency in Existing Buildings	**RCS Goal 14:** Promote efficient and sustainable use of energy resources through conservation, demand-reduction activities, and alternative energy sources. **RCS Policy 14.1:** Consider the goals and policies in SANDAG's Regional Energy Strategy in drafting new legislation, policies, or procedures. **RCS Policy 14.2:** Collaborate with San Diego Gas and Electric (SDG&E) and any other local energy suppliers and distributors to promote energy conservation programs, Energy Star® appliance change-out programs, rebates, vouchers, and other incentives to install energy-efficient technology and products.
Measure E-3: Smart Meters	**RCS Goal 14:** Promote efficient and sustainable use of energy resources through conservation, demand-reduction activities, and alternative energy sources. **RCS Policy 14.1:** Consider the goals and policies in SANDAG's Regional Energy Strategy in drafting new legislation, policies, or procedures.
Measure E-4: Small-Scale Renewable Energy Installations	**RCS Goal 14:** Promote efficient and sustainable use of energy resources through conservation, demand-reduction activities, and alternative energy sources. **RCS Policy 14.1:** Consider the goals and policies in SANDAG's Regional Energy Strategy in drafting new legislation, policies, or procedures. **RCS Policy 14.12:** Provide, where possible, incentives for renewable energy projects (e.g., reduced fees and expedited permit processing), creative financing (e.g., subsidized or other low-interest loans and/or the option to pay for system installation through long-term assessments on individual property tax bills), as well as other support for community members or developers seeking funding for such projects.
Measure E-5: Tree Preservation and Urban Forests	**RCS Policy 5.4:** Preserve, protect, and enhance the City's urban forest (on both public and private property). **RCS Policy 5.5:** Consider adoption of a tree preservation ordinance to address tree preservation on private property. **RCS Policy 8.4:** Preserve and increase the amount of open space/forest land within the City to help mitigate GHG emissions.
Transportation (T)	
Measure T-1: Bicycle and Pedestrian Travel	**CE Policy 2.3:** Incorporate multi modal improvements into pavement resurfacing, restriping, and signalization operations where the safety and convenience of users can be improved within the scope of work. **CE Goal 6:** Develop an efficient bicycle and pedestrian circulation system that improves access and linkages in a manner that is human-scaled, bicycle- and pedestrian-oriented, and transit-accessible, encourages use of these facilities for recreation, and provides alternatives to the personal automobile. **CE Policy 6.1:** Implement the bicycle plan and pedestrian plan improvements identified in this Circulation Element according to their identified priorities. **CE Policy 6.2:** Require proposed development to provide bike facilities within the right-of-way for Class II bikeways in the project vicinity on all arterial roadways where deemed appropriate. Where Class II bikeways are not feasible, require Class III bike routes to be provided as a temporary measure. **CE Policy 6.5:** Establish minimum design criteria for pedestrian circulation. These design criteria may distinguish between urban and rural conditions. **CE Policy 6.7:** Require developers to provide facilities for pedestrian travel such as sidewalks, design developments to provide pedestrian access to the development via sidewalks, and avoid requiring that pedestrians use driveways to access development.

Measure	General Plan 2030 Goal/Policy
	CE Policy 6.8: Design and retrofit bicycle facilities in accordance with the design standards identified in the City's Bicycle Master Plan. **CE Policy 6.12:** Require developers and public agencies to install bicycle racks and other bicycle amenities where appropriate. **LUCI Policy 4.3:** Ensure that new and redeveloped projects are designed to improve pedestrian and transit connections, and connections to trail and bicycle networks. **LUCI Policy 4.4:** Encourage new and redeveloped projects to incorporate facilities that support bicycle use, such as bike racks, lockers, and/or showers, to the extent possible and appropriate. **LUCI Policy 5.1:** Provide a dense, interconnected network of local and collector streets that supports walking, bicycling and transit use, while avoiding excessive traffic in residential neighborhoods. **LUCI Policy 5.2:** Ensure that the entire right-of-way is designed to accommodate appropriate modes of transportation. **LUCI Goal 12:** Foster coordinated planning and cooperation with SANDAG and other local, county, regional, special purpose, state, and federal agencies to maximize the effectiveness of interagency planning, policies, and funding opportunities.
Measure T-2: Transit Travel	**CE Goal 5:** Encourage alternative forms of transportation to private automobiles that meet the needs of all City residents by providing improved access to transit connections to employment and other activity centers. **CE Policy 5.1:** Coordinate with NCTD to continue to expand local rail and bus service to and within Vista. Particular emphasis should be placed on improving access to transit within the downtown core and high density residential areas to achieve the regionally accepted Smart Growth principles. **CE Policy 5.2:** Support the efforts of SANDAG and NCTD to double-track the SPRINTER line and allow for grade separation projects at major intersections in the City. **CE Policy 5.4:** Require construction of bus turnouts with shelters adjacent to new development where transit demand warrants such improvements. **CE Policy 5.5:** Coordinate with SANDAG to maintain the current Park and Ride facility and add additional facilities if the demand warrants. **CE Policy 5.6:** Coordinate with NCTD to maintain and upgrade transit stops to provide safe, attractive, and clearly identifiable stops throughout the community. **LUCI Goal 12:** Foster coordinated planning and cooperation with SANDAG and other local, county, regional, special purpose, state, and federal agencies to maximize the effectiveness of interagency planning, policies, and funding opportunities.
Measure T-3: Commute Trip Reduction	**CE Policy 3.6:** Promote alternatives to driving alone during peak periods, such as carpooling, vanpooling, bicycling, telecommuting, flexible work hours for employees, and transportation demand management (TDM) programs. **LUCI Goal 12:** Foster coordinated planning and cooperation with SANDAG and other local, county, regional, special purpose, state, and federal agencies to maximize the effectiveness of interagency planning, policies, and funding opportunities.
Measure T-4: Smart Growth	**LUCI Goal 4:** Promote sustainable and smart growth land use patterns and development regulations and guidelines. **LUCI Policy 4.1:** Encourage mixed-use projects (including residential/commercial/office and live/work developments) in designated areas, such as close to SPRINTER stations; along high frequency public transportation

Measure	General Plan 2030 Goal/Policy
	corridors; in the Downtown Specific Plan; in certain Opportunity Areas; and near jobs, schools, parks, and recreational facilities. **LUCI Policy 4.5:** Designate areas for the development of mixed-use projects where alternative modes of transportation, such as walking, biking, and transit, will be emphasized over vehicle use. **LUCI Policy 4.6:** Promote mixed-use development in targeted areas by developing zoning classifications, development standards, and design guidelines that are appropriate for the scale, intensity, and character desired for the particular area. **LUCI Policy 4.7**: Develop and offer incentives for mixed-use development, such as reduced parking requirements, expedited permit processing, and/or lot consolidation assistance. **LUCI Policy 4.8:** Mixed use development projects shall be evaluated based on consistency with the City's zoning regulations and adopted Design Guidelines, as well as SANDAG Smart Growth publications including: (1) Designing for Smart Growth, Creating Great Places in the San Diego Region; (2) Planning and Designing for Pedestrians, Model Guidelines for the San Diego Region; (3) Trip Generation for Smart Growth; and (4) Parking Strategies for Smart Growth. **LUCI Policy 6.3:** Ensure implementation of focused revitalization and changes in areas known as Opportunity Areas. **LUCI Policy 9.3:** Develop zoning classifications for mixed-use development that incorporates higher density land uses along multi-modal corridors, and that is compatible with the existing community character. **LUCI Policy 9.4:** Consider providing incentives for senior housing, mixed-use projects, and mixed-income development. **LUCI Goal 12:** Foster coordinated planning and cooperation with SANDAG and other local, county, regional, special purpose, state, and federal agencies to maximize the effectiveness of interagency planning, policies, and funding opportunities. **LUCI Policy 12.1:** Work with SANDAG to achieve regional smart growth goals through implementation of the Regional Comprehensive Plan and Smart Growth Concept Map, as identified in the Opportunity Areas and supporting goals and policies throughout the General Plan. **LUCI Policy 12.2:** Encourage SANDAG to update the Smart Growth Map to incorporate changes consistent with the Vista General Plan. **LUCI Goal 14:** Update the City's zoning code and other standards and/or guidelines regulating land use to implement the goals and policies of the Land Use and Community Identity Element. **LUCI Policy 14.1:** Revise zoning designations, development standards, and design guidelines to be consistent with the Land Use and Community Identity Element. **LUCI Policy 14.2:** Revise the Zoning Code to create one or more zones to implement the Mixed Use land use designation, including development standards that provide incentives for mixed use, such as reduced parking requirements and minimum residential unit sizes. **CE Policy 8.5:** Exercise flexibility in the application of parking standards to support transit-oriented development.
Solid Waste (S)	
Measure S-1: Expanded Recycling	**RCS Goal 15:** Reduce the amount of solid waste generated and diverted to landfills. **RCS Policy 15.1:** Comply with the Integrated Waste Management Act by maintaining an up-to-date Source Reduction and Recycling Element and Non-Disposal Facility Element.

Measure	General Plan 2030 Goal/Policy
	RCS Policy 15.3: Create a mandatory green waste collection and recycling program for multi-family residences and commercial, retail, and industrial operations.
Measure S-2: Construction and Demolition Debris Diversion	**RCS Goal 15:** Reduce the amount of solid waste generated and diverted to landfills. **RCS Policy 15.1:** Comply with the Integrated Waste Management Act by maintaining an up-to-date Source Reduction and Recycling Element and Non-Disposal Facility Element. **RCS Policy 15.4:** Maintain the Construction and Demolition Debris Recycling Ordinance, requiring building projects to recycle or reuse a minimum percentage of non-hazardous construction and demolition debris and unused or leftover building materials.
Community Education and Outreach (C)	
Measure C-1: Community Education and Outreach	**RCS Policy 2.4:** Develop a public outreach program to increase public awareness of climate change and climate protection challenges; publicize the importance of reducing GHG emissions; and provide information on actions community members and businesses can take to reduce their individual impacts. **PSFS Policy 2.7:** Provide and support community education, outreach, and training programs to increase public awareness of natural and human-made emergencies and disasters; and increase citizens' ability to be prepared for, and self-sufficient after, emergency and disaster situations, when they may initially be on their own (e.g., water and food storage, first aid, family emergency plans, etc.).
Adaptation (A)	
Measure A-1: Climate Change Vulnerability	**RCS Policy 2.3:** Participate in inter-agency and/or inter-jurisdictional meetings and planning activities to share best practices and adaptation strategies to reduce GHG emissions, increase community sustainability, and educate the public about climate change.
Measure A-2: Public Health and Safety	**PSFS Policy 2.1:** Continue to participate in the development and updating of the Multi-Jurisdictional Hazard Mitigation Plan (HMP) for San Diego County and participating jurisdictions. **RCS Policy 8.1:** Through the development review process, ensure that new development located in or near areas that may pose public health and safety hazards (such as flood plains, areas of known or suspected geologic hazard, and/or fire hazard zones) is designed to minimize potential impacts on people and property. **HV Goal 1:** Work with community partners to improve overall health and well-being of Vistans. **HV Policy 1.1:** Continue and enhance the collaboration among the City and community partners (such as health care providers, mental health providers, public health advocates, the Vista Community Clinic, the Vista Unified School District [VUSD], businesses, other governments and agencies, the Boys and Girls Club, the YMCA, neighborhood organizations, faith-based organizations, and other community partners) in identifying public health issues and developing and implementing a community-based approach to health and wellness in Vista. **PSFS Goal 5:** Protect life, property, and the environment from structural, wildland-urban, and wildland fire damage. **PSFS Policy 13.2:** Conduct community-wide awareness and education efforts for healthy living, disaster planning, public health issues, and injury prevention.

Measure	General Plan 2030 Goal/Policy
Measure A-3: Water Resources	**RCS Goal 3:** Reduce the projected demand for water service in the City through water conservation and increased use of recycled water. **RCS Policy 3.1:** Work with the Vista Irrigation District to reduce per capita water consumption, increase the use of recycled water, and implement, enhance, or promote programs to educate the community about the importance of water conservation and methods to reduce water use. **PSFS Goal 11:** Continue to ensure that the City has an adequate, safe, and reliable water supply to meet the existing and planned needs of the community. **PSFS Policy 11.3:** Promote water conservation programs and use of recycled water to reduce Vista's demand for potable water.
Measure A-4: Biodiversity and Habitats	**RCS Goal 7:** Conserve, enhance, and restore, to the extent practicable, open space areas for the protection of wildlife habitats and plant and animal species. **RCS Policy 7.1:** Acquire or otherwise protect, where possible, open space and other properties that contain or protect significant sensitive resources, such as special-status plant and wildlife species know to occur in or near the City, natural habitats, and habitat linkages. Primary consideration shall be given to those properties within the City's Biological Preserve Overlay. **RCS Policy 8.1(a):** Promote the protection of open space on private property for the protection of health and safety through continued application of the Open Space Residential (OSR) and Rural Residential (RR) land use designations and specific plans as appropriate.
Measure A-5: Energy Supply	**RCS Goal 14:** Promote efficient and sustainable use of energy resources through conservation, demand-reduction activities, and alternative energy sources.

GLOSSARY

OF TERMS

Glossary of Terms

Actions: The steps that will be taken to implement the Climate Action Plan and reduce GHG emissions.

Adaptation: The ability to adjust to, or minimize, the potential impacts of climate change or other environmental disturbances.

Baseline Emissions: The amount of GHG emissions released in a designated year against which future changes in emissions levels are measured.

Bicycle Lane (Class II): According to Caltrans' Highway Design Manual, Chapter 1000, a bicycle lane is a Class II Bikeway and provides a striped lane for one-way bicycle travel on a street or highway.

Bicycle Path (Class I): According to Caltrans' Highway Design Manual, Chapter 1000, a bicycle path is a Class I Bikeway and provides a completely separated right of way for the exclusive use of bicycles and pedestrians with cross flow by motorists is minimized.

Bicycle Route (Class III): According to Caltrans' Highway Design Manual, Chapter 1000, a bicycle route is a Class III Bikeway and provides for shared use with pedestrian or motor vehicle traffic.

Business-as-Usual: A scenario used for the projection of GHG emissions at a future date based on current technologies and regulatory requirements in absence of other reductions.

California Environmental Quality Act (CEQA): A state law requiring state and local agencies to assess the environmental impacts of a proposed private or public project they undertake or permit. If a proposed activity has the potential for a significant adverse environmental impact, an environmental impact report (EIR) must be prepared and certified as to its adequacy before action can be taken on the proposed project.

Carbon Dioxide (CO_2): A naturally occurring gas, and also a by-product of burning fossil fuels and biomass, as well as land-use changes and other industrial processes. It is the principal anthropogenic GHG that affects the Earth's radiative balance. It is the reference gas against which other GHGs are measured and therefore has a Global Warming Potential of 1.

Carbon Dioxide Equivalent (CO_2e): This is a common unit for combining emissions of GHGs with different levels of impact on climate change. It is a measure of the impact that each gas has on climate change and is expressed in terms of the potency of carbon dioxide. For carbon dioxide itself, emissions in tons of CO_2 and tons of CO_2e are the same, whereas for nitrous oxide and methane, stronger GHGs, one ton of emissions is equal to 310 tons and 21 tons of CO_2e respectively.

Chlorofluorocarbons (CFCs): A family of inert, nontoxic, and easily liquefied chemicals used in refrigeration, air conditioning, packaging, insulation, or as solvents and aerosol propellants. Because CFCs are not destroyed in the lower atmosphere, they drift into the upper atmosphere, where their chlorine components destroy ozone.

Climate: Climate in a narrow sense is usually defined as the "average weather," or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time

ranging from months to thousands of years. The classical period is three decades, as defined by the World Meteorological Organization. These quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system.

Climate Action Plan: A description of the measures and actions that a local government will take to reduce GHG emissions and achieve an emissions reduction target. Most plans include a description of existing and future year emissions; a reduction target; a set of measures, including performance standards, that will collectively achieve the target; and a mechanism to monitor the plan and require amendment if its not achieving specified levels. Interchangeable with GHG Reduction Plan.

Climate Change: Climate change refers to any significant change in measures of climate (such as temperature, precipitation, or wind) lasting for an extended period (decades or longer). Climate change may result from: natural factors, such as changes in the sun's intensity or slow changes in the Earth's orbit around the sun; natural processes within the climate system (e.g. changes in ocean circulation); human activities that change the atmosphere's composition (e.g. through burning fossil fuels) and the land surface (e.g. deforestation, reforestation, urbanization, desertification, etc.).

Co-Benefit: Additional benefits that occur as a result of GHG reduction measures. These include financial savings, improved air quality, increased health or safety, natural resource conservation, reduced energy use, etc.

Connectivity: A well connected circulation system with minimal physical barriers that provides continuous, safe, and convenient travel for all users of streets, roads, and highways.

Emissions: The release of a substance (usually a gas when referring to the subject of climate change) into the atmosphere.

Emissions Factor: A set of coefficients used to convert data provided on energy use and energy use reductions to emissions. These emission factors are the ratio of emissions of a particular pollutant (e.g., carbon dioxide) to the quantity of the fuel used (e.g., kilograms of coal). For example, when burned, 1 ton of coal = 2.071 tons of CO_2.

Emissions Forecast: The projected emissions that would occur in a future year based on growth multipliers applied to the baseline year.

Energy Conservation: Reducing energy consumption. Energy conservation can be achieved through energy efficiency (getting the most productivity from each unit of energy) or by reduced use of energy such as turning off appliances when not in use.

Energy Efficiency: Using less energy to provide the same level of service or complete the same task. For example, a more efficient light will use less electricity to provide the same amount of illumination.

Fossil Fuel: A general term for combustible geologic deposits of carbon, including coal, oil, natural gas, oil shale, and tar sands. These fuels emit carbon dioxide into the atmosphere when burned, thus significantly contributing to the enhanced greenhouse effect.

Global Warming: Global warming is an average increase in the temperature of the atmosphere near the Earth's surface and in the troposphere, which can contribute to changes in global climate patterns. Global warming can occur from a variety of causes, both natural and human induced. In common usage, "global warming" often refers to the warming that can occur as a result of increased emissions of GHGs.

Greenhouse Effect: Trapping and build-up of heat in the atmosphere (troposphere) near the Earth's surface. Some of the heat flowing back toward space from the Earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the atmosphere and then reradiated back toward the Earth's surface. If the atmospheric concentrations of these GHGs rise, the average temperature of the lower atmosphere will gradually increase.

Greenhouse Gas (GHG): Any gas that absorbs infrared radiation in the atmosphere. GHGs include, but are not limited to, water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), ozone (O_3), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Greenhouse Gas Emissions Inventory: A GHG emissions inventory provides estimates of the amount of GHGs emitted to and removed from the atmosphere by human activities. A city or county that conducts an inventory looks at both community emission sources as well as emissions from government operations. A base year is chosen and used to gather all data from that year. Inventories include data collection from such things as vehicle miles traveled (VMTs), energy usage from electricity and gas, and waste. Inventories include estimates for carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), hydroflourocarbons (HFCs), and perflourocarbons (PFCs), which are referred to as the "six Kyoto gases."

Heat Island Effect: This phenomenon describes urban and suburban temperatures that are 2° to 10°F (1° to 6°C) warmer than nearby rural areas. As urban areas develop, buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist become impermeable and dry. These changes cause urban regions to become warmer than their rural surroundings, forming an "island" of higher temperatures in the landscape.

Heating, Ventilation, and Air Conditioning (HVAC): Controls the ambient environment (temperature, humidity, air flow and air filtering) of a building and must be planned for and operated along with other data center components such as computing hardware, cabling, data storage, fire protection, physical security systems and power.

Hydrofluorocarbons (HFCs): Man-made compounds containing hydrogen, fluorine, and carbon, many of which have been developed as alternatives to ozone-depleting substances for industrial, commercial, and consumer products, that have a range of global warming potentials. HFCs do not have the potential to destroy stratospheric ozone, but they are still powerful GHGs.

Infill Site: A site in an urbanized area that meets criteria defined in *Public Resources Code* Section 21061.3.

Intergovernmental Panel on Climate Change (IPCC): The IPCC was established jointly by the United Nations Environment Program and the World Meteorological Organization in 1988. The purpose of the IPCC is to assess information in the scientific and technical literature related to all significant components of the issue of climate change. The IPCC draws upon hundreds of the world's expert scientists as authors and thousands as expert reviewers. Leading experts on climate change and environmental, social, and

economic sciences from some 60 nations have helped the IPCC to prepare periodic assessments of the scientific underpinnings for understanding global climate change and its consequences. With its capacity for reporting on climate change, its consequences, and the viability of adaptation and mitigation measures, the IPCC is also looked to as the official advisory body to the world's governments on the state of the science of the climate change issue. For example, the IPCC organized the development of internationally accepted methods for conducting national GHG emission inventories.

Kilowatt (KW): One thousand watts.

Kilowatt-hour (KWh): an amount of electricity equivalent to the use of one kilowatt for one hour. A hundred watt light bulb that is on for 10 hours uses one kilowatt-hour of electricity (100 watts x 10 hours = 1,000 watt-hours = 1 kilowatt-hour). Electricity production or consumption is often expressed as kilowatt- or megawatt-hours produced or consumed during a period of time.

Methane (CH_4): A hydrocarbon that is a GHG with a global warming potential estimated at 21 times that of carbon dioxide (CO_2). Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.

Measure: A way to reduce GHG emissions.

Metric Ton (MT): Common international measurement for the quantity of GHG emissions. A metric ton is equal to 2205 lbs or 1.1 short tons.

Mitigation: An action to either reduce the amount of GHGs being emitted into the atmosphere or remove previously emitted gases from the atmosphere.

Mixed-Use: Mixed Use development means combining a variety of compatible land uses in a single development, and can be creatively used to create vibrant centers for living, working, and shopping. The primary purpose of the Mixed Use land use designation is to implement the principals of smart growth by applying the designation to certain areas along the City's main transportation corridors that could successfully support a combination of uses (multi-family residential, retail, and office uses) within a single development plan.

Natural Gas: Underground deposits of gases consisting of 50 to 90 percent methane and small amounts of heavier gaseous hydrocarbon compounds such as propane and butane.

Perfluorocarbons (PFCs): Potent GHGs that accumulate in the atmosphere and remain there for thousands of years. Aluminum production and semiconductor manufacture are the largest known man-made sources of perfluorocarbons.

Recycling: Collecting and reprocessing a resource so it can be used again. An example is collecting aluminum cans, melting them down, and using the aluminum to make new cans or other aluminum products.

Renewable Energy: Energy generated from sources that are naturally replenished or not used up in the course of providing power (e.g., wind, solar, biomass, and geothermal).

Retrofit: The addition of new technology or features to older systems. For example, adding new energy-efficient lamps to existing lighting fixtures.

Sector: A term used to describe emission inventory source categories for GHGs based on broad economic sectors.

Smart Growth: A compact, efficient, and environmentally sensitive pattern of development that provides people with additional travel, housing, and employment choices by focusing future growth away from rural areas and closer to existing and planned job centers and public facilities, while preserving open space and natural resources.

Smart Meter: An electrical meter that tracks power consumption in real-time, communicates with the local utility company for monitoring and billing purposes, and (if connected to a smart grid) can adjust a building's energy use automatically to reduce demand on the power grid at peak use times.

Solar Photovoltaic: A system that converts sunlight directly into electricity using cells made of silicon or other conductive materials. When sunlight hits the cells, a chemical reaction occurs, resulting in the release of electricity.

Source: Any process or activity that releases a GHG into the atmosphere.

Target Year: The year by which the emissions reduction target should be achieved.

Transit Oriented Development: A moderate- to high-density development located within a 5-10 minute walk (or roughly ¼ mile) of a major transit stop, generally with a mix of residential, employment, and shopping opportunities. TOD encourages walking, bicycling, and transit use without excluding the automobile.

Transportation Demand Management (TDM): A strategy for reducing demand on the road system by reducing the number of vehicles using the roadways and/or increasing the number of persons per vehicle. For example, TDM attempts to reduce the number of persons who drive alone during the commute period and to increase the number in carpools, vanpools, buses or trains, or walking or biking.

Vehicle-Miles Traveled (VMT): One vehicle traveling the distance of one mile. Total vehicle miles is the aggregate mileage traveled by all vehicles. VMT is a key measure of overall street and highway use. Reducing VMT is often a major objective in efforts to reduce vehicular congestion and achieve air quality goals.